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The Outlook

The Slip-wing Fighter

AS we expected, Mr. Pemberton-Billing's statement that it should always be possible to design a bomber to be faster than any contemporary fighter has produced considerable discussion in our Correspondence columns. This week Mr. Pemberton-Billing gives his contribution to the discussion in a short article on what he terms the slip-wing fighter, that is a fighter launched in the same way as his original suggestion for a bomber.

Briefly summarised, P.-B.'s argument is that the fighter can be either fast or manœuvrable, but that it cannot be both, and that therefore the bomber, which *can* be fast but need not be manœuvrable, starts with an initial advantage. He points out that even if the fighter is provided with a rear gun turret, power-operated, and this turret is made retractable, it will offer excessive drag and reduce the speed of the fighter by some 50 m.p.h., just at the instant when the fighter most needs its maximum speed.

Here we would like to recall a suggestion made a year or two ago by another of our contributors, Capt. Norman Macmillan. His suggestion was broadside armament; not necessarily movable as the pilot could do the sighting in the same way that he does now with multi-gun fighters, except, of course, that some special form of reflector sight would have to be used. It does seem possible that Mr. Pemberton-Billing's objection to the rear turret could be circumvented in that way.

What would be the effect on an aeroplane of firing broadsides from it we do not know. Guns-in-the-wings fighters are slowed down considerably by the recoil, and their noses drop when firing takes place. Presumably broadside guns would tend to make the aeroplane skid or sideslip, and if their recoil were not in line with the c.g. directional control might become affected. These difficulties, however, do not appear to be insurmountable. If the "broadsides fighter" could be designed with not much more than the muzzles projecting, the drag would not be great. The "Cazeaux effect" would have to be considered, but opinions appear to differ concerning its seriousness. Mr. J. D. North, for one, used to regard it as not very important.

Fuel Injection and Altitude

THE reason usually given for Germany's adoption of direct fuel injection is that this system of feeding the petrol to the engine avoids risk from freezing, that very good fuel economy is obtained, and that possibly slightly inferior fuels may be employed without serious loss of power.

Our attention was called, the other day, to a possibility that there may be yet another reason for Germany's concentration on direct injection in place of the carburettor. On several occasions during the last year or so *Flight* has pointed out that it would not be in keeping with German ways to let her altitude research work lay fallow when obviously there is a fruitful military field for it. Mr. Pemberton-Billing, in his article in last week's issue, came to much the same conclusion, particularly since the *Luftwaffe* seems to be content (it probably has to be) with area bombing, the only sort that can be undertaken from extreme heights. The inducement of being able to send bombers over this country at heights beyond the reach of anti-aircraft guns and fighters is too obvious to require stressing.

It may well be with a view to its advantages for work at very great heights that Germany has adopted fuel injection. The carburettor, while serving us well at altitudes up to 25,000 or 30,000 ft., does suffer from the disadvantage that the air supply is restricted, due to the fact that a much larger volume of the rarefied air has to be supplied to the engine in order to make up for the lower density. With direct injection this restriction does

not apply, and it is scarcely likely that German technicians have overlooked this fact. Thus there seems to be here one more pointer which links up Germany's preference for direct injection and her expenditure of energy and money on altitude research.

That there are many other difficulties we are aware. The evaporation of the fuel at extreme heights is one. Trouble with electrical equipment, including ignition, is another, but we may be sure that German research establishments have not been idle since the head of the D.V.L. lectured to the Royal Aeronautical Society some time before the war. It behoves us to be on guard lest we should be taken by surprise.

The Coastal Command

IT is satisfactory to see that the Prime Minister has taken the view expressed in these columns last week about the position of the Coastal Command. There is no need, said Mr. Churchill, at the present time to change the position of the Coastal Command. The use of the words "at the present time" means that the Government is not debarred from reorganisation of our defence arrangements at some future date when it may have leisure to consider all these questions from the point of view of the ideal best rather than from that of the most convenient at the moment.

As we remarked before, if we were now starting to organise our defences with a clean slate, the Coastal Command would certainly be placed under the Admiralty, and so it may be in the future. But for the present it is better to leave well alone. The Prime Minister's rather Churchillian phrases about the "integrity of operational direction" and the rest, can hardly mean anything except that things have gone well hitherto and that they will no doubt continue to go well. The Admiralty is to determine the "operational policy" of the Coastal Command; which means, we take it, in ordinary English that their Lordships will tell Air Chief Marshal Sir Frederick Bowhill what they want done, and he will do his best to see that it is done. That, to the best of our knowledge and belief, is what has been happening since the beginning of the war.

It will be noticed that Mr. Churchill interposed in this discussion in his capacity as Minister of Defence. It was a timely intervention, for a dispute between the papers controlled by Lord Beaverbrook, on the one hand, and Lord Trenchard with his fixed conviction that everything which flies ought to be under the Air Ministry on the other, can do no good at the present time. It is not a moment for deciding a question on merits, but on expediency, and, as Mr. Churchill added a little later in the debate, "the last thing we want is an inter-Services controversy."

The expansion of the Coastal Command, which the Prime Minister also announced, has nothing to do with the question of control. The Germans are now striking at British shipping far out in the Atlantic, by means of U-boats based on Lorient, and long-range bombers based on Bordeaux. In dealing with them, the Royal Navy no-longer has the help of the full French Navy, it has no airships, and it has lost two carriers. The situation calls for both search and striking power, and the Coastal Command is the only agency which can come to the Navy's help in this emergency. It was obvious that it would have to be strengthened in order to undertake its new responsibilities, and the Prime Minister said that some substantial increases have already been carried out.

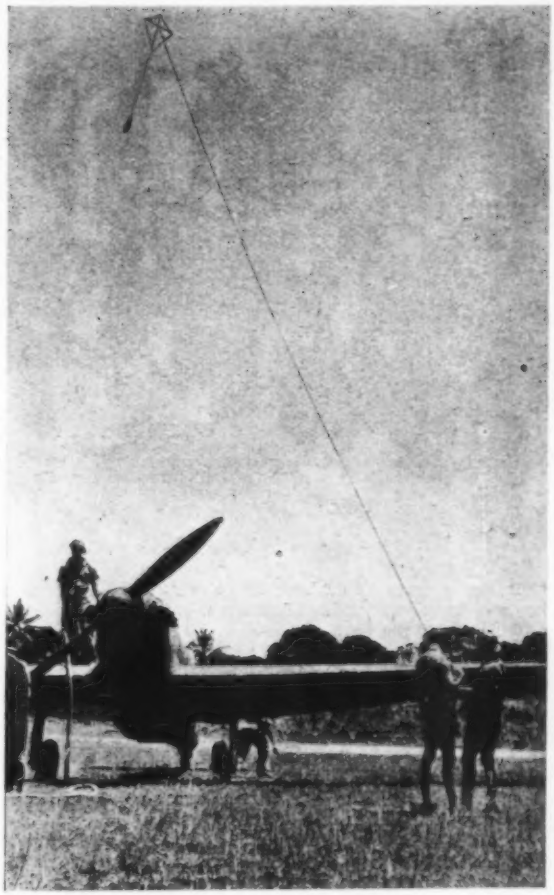
DECEMBER MORN: Preparing for an early patrol at a Hurricane-equipped Fighter Station.

WAR in the AIR

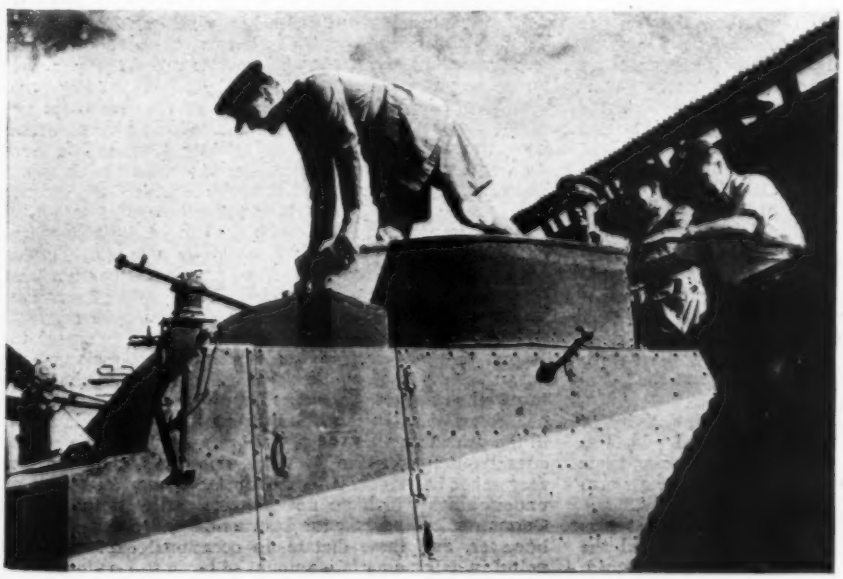
Forward, the Army of the Nile! : German Bombing Policy : Floating Balloon Barrage

THE main interest continues to centre in the Mediterranean theatre. Not only have the Greeks continued to advance, though more slowly and with greater caution, but the British have commenced an attack in the Western Desert and have met with very gratifying success up to the moment of writing. For months Marshal Graziani has been standing still waiting for something—it has never been clear what he was waiting for—and now the period of waiting has come to an end, though in a different manner from that which had been expected.

It is part of the art of generalship to deceive one's enemy as to one's intentions, by rumour as much as by manœuvre. At this distance it is not possible to say with confidence whether the rumours about British strategy in the Western Desert were set afoot deliberately with the intention of deceiving the Italians, but they have evidently had that effect. Correspondents in the Near East have regularly emphasised the difficulties of an advance across a desert which held little water and few roads, and have stressed the point that when Graziani advanced he would lengthen his lines of communication, while the defending British forces would shorten theirs as they fell back, thus gaining an advantage. Now General Wavell has thrown all such considerations to the wind, and has himself advanced across the desert. Without any doubt, he has taken the Italians by surprise, and has broken through their advanced lines, which consisted of a series of fortified camps. At the present moment it is not possible to say with confidence whether this British attack will develop into a full-scale offensive with the object of completely defeating the large Italian Army, or whether it is merely a front-line skirmish of a major nature. In either case, it means that the British have seized the initiative, and have hit the Italians hard at a moment when their star is by no means in the ascendant, and when the news which must be reaching the Italian soldiery from the Albanian front is not likely to stiffen their fighting spirit. When men whose tails are already down are suddenly hit hard, the blow has a double effect. We may hope that still further successes will attend the spirited British attack.



GETTING AROUND : A picture from Kenya showing that Hurricanes are in service on this front. The kite is not a new method of getting increased lift, but a form of amusement to while away time



THOROUGHGOING: Air Chief Marshal Sir A. Longmore, Air Officer Commanding-in-Chief Middle East Command inspects one of the R.A.F. Armoured Car units.

Quite apart from the capture of the important port of Sidi Barrani and the capture of a few thousand prisoners, including several Generals, the impression created in the Near East is very important. The Turks, no mean judges of matters military, are saying that now the chances of the Germans advancing to

WAR IN THE AIR (CONTINUED)

AID TO THE UTMOST: R.A.F. personnel disembarking in Greece to lend a useful hand against Italy.

capture the Suez Canal and the oilfields of Iraq and Iran beyond, have vanished. They could only have made that advance with the help of allies, and Italy cannot now be counted on as a useful ally. Hitler may, none the less, make an attempt to dominate the Balkans; in fact, it is most improbable that the German forces will not make a move in that direction sooner or later, but it is quite an important point that the Turks are now growing convinced that in signing a treaty with Britain they had backed the right horse. The fear of Italy is also definitely waning in Jugoslavia, and Bulgaria and Spain must also be impressed. All these things are to the good.

It is clear that the Royal Air Force has played an important part in the British success. The Prime Minister has stated that the advance had been timed for an earlier date, but had to be postponed because R.A.F. squadrons were sent to the help of Greece, and so the air strength in Egypt was below what was thought desirable. But while the Greeks advanced, with the R.A.F. giving them mighty help, the air strength in Egypt was quietly brought up again to the desired pitch.

The Battle of Sidi Barrani

DETAILED reports have now been received showing the part played by the R.A.F. in support of the military offensive in the Western Desert. They show that on the first day (Dec. 9) every enemy aerodrome from Derna to Sidi Barrani was heavily raided by our bombers, causing great damage. In addition, our fighters and bombers continually attacked enemy troop concentrations and motor transport over the whole operational area. Twenty-two enemy aircraft were reported shot down or destroyed—18 confirmed and four unconfirmed. One squadron accounted for eleven of these, four of which were seen burning on the ground at the same time. Another fighter squadron caused great damage to enemy communications and inflicted numerous casualties on enemy personnel by dive machine-gun attacks. Later reconnaissance flights reported large fires west of Buq-buq and in other areas enemy motor transport burning on the roads causing dislocation to the enemy troop movement. During these intensive air operations, carried out continuously from dawn till dusk, only three of our aircraft failed to return to their bases, but the pilots of two are safe within our territory.

On the subsequent days of the advance the activity of the British bombers and fighters was maintained. In fact, the use of the R.A.F. by the Middle East Command has been a splendid example of the employment of the air arm in support of military operations.

It goes without saying that the Royal Navy has also played its part in the desert advance, for it shelled the Italians along the coast as the British troops advanced. continued to attack Valona, one of the two useful ports in Albania which remain in Italian hands. In fact, Valona and Durazzo must now be far from being in the first line of utility. The Greeks have noticed that on some sectors the Italians have been short of material, which suggests that they are not getting full supplies through the ports up to their firing line. Nevertheless the Italian retreat in Albania has not yet become a rout.

The Fleet Air Arm has also joined in the harrying of the Italian bases and troops. One is inclined to feel sorry for the conscripted Libyans who are obliged to fight for the Italians. All Libyans have bitter memories of the cruelties practised on their race by Graziani when he was Governor of the colony.

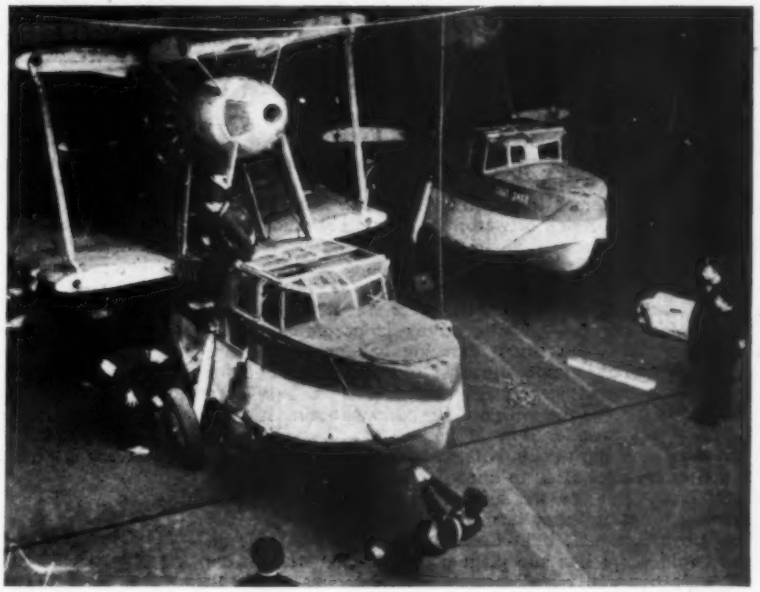
In addition to the fine work of the aeroplanes in Egypt, bombers have

German Raiding of Britain

THE German bombers have adopted new tactics in their raids on Great Britain. By day their efforts do not seem to be at all serious. Formations and single machines approach our coast, but readily turn back when tackled by our fighters. Evidently they know that they are not expected to do much, and have no intention of losing their lives, if they can help it, in minor operations. Consequently, for some time past London has rarely heard the sirens by day.

By night the rule seems to be to save up for a big and vicious raid every now and again, and London appears to be thought less worthy of attention than the industrial towns in other parts of the country, so gets only occasional attention on any considerable scale. On the night of Sunday, December 8, there was a heavy raid on London, and on that of Wednesday, December 11, there was a lighter one. On the latter night and on December 12 there were raids on towns in the Midlands. We know that the Germans do contrive to get agents over here, for two of their spies have just been executed, and those agents have probably reported that bombing London has done nothing material towards winning the war for the Germans. The defences are good, and the raiders have to fly at such a height that they cannot take accurate aim at targets of military importance, while the area is so large that the chances of hitting a military target by sporadic bombing are very small. The spirit of the population has not been broken and is not to be broken. The policy of terrorism has manifestly failed. Such considerations have probably weighed with the saner minds among the leaders of the *Luftwaffe* Mr. Dalton believes that the Germans have now used up most of the petrol supplies which they captured when France surrendered, and he has the best sources of information. In fact the hurry to seize Rumania points in the same direction. If petrol has again become a serious consideration with the Germans, one can understand that they must be reluctant to use up large quantities of it on undertakings which do not promise really useful results. German spite and lust for destruction and cruelty remain, however, and these dictate an occasional expenditure of petrol in doing a certain amount of harm to London. That

WAR IN THE AIR (CONTINUED)



THE TIME HAS COME : Fleet Air Arm ratings pulling a Vickers Walrus to the lift on an aircraft carrier.

may be the explanation of the present programme of raiding; but we may also suspect a hope that considerable numbers of A.A. guns will be moved away from the Capital to protect other cities, thus leaving London comparatively open to a surprise attack some night.

Whatever the true reason for the new policy may be, it is at least pleasing to see any evidence that the enemy is going slow in his expenditure of petrol. After the R.A.F. attacks on communications in Germany, it cannot be a very simple matter to transport large quantities of the stuff from Rumania to the aerodromes in Northern France; and there is also the probability that supplies of it nearer to the Balkans are now considered of more importance. As yet Germany has not showed her hand there.

The Coastal Command

THE position of shipping in the Atlantic and on the western approaches to Great Britain has been causing anxiety. The Germans have sent out a new wave of U-boats in that direction. They are also using long-range aircraft, Focke-Wulf Condors among them, from the base near Bordeaux to harry British shipping. For that reason the R.A.F. raids on the aerodrome near Bordeaux are important; though we know that it is a difficult matter to put an aerodrome out of action by bombing it. Recently the Prime Minister expressed his regrets, in a tone of some indignation, that British naval and air forces were unable to use bases in Eire as starting points for attacks on the German U-boats and bombers in the Atlantic. Attention was then directed towards the Coastal Command, and in some quarters a demand arose that this force should be placed more directly under the control of the Admiralty, if not handed over entirely to the Navy.

On December 10 Mr. Simmonds raised the question in the House of Commons, and in reply the Prime Minister made the following statement:—

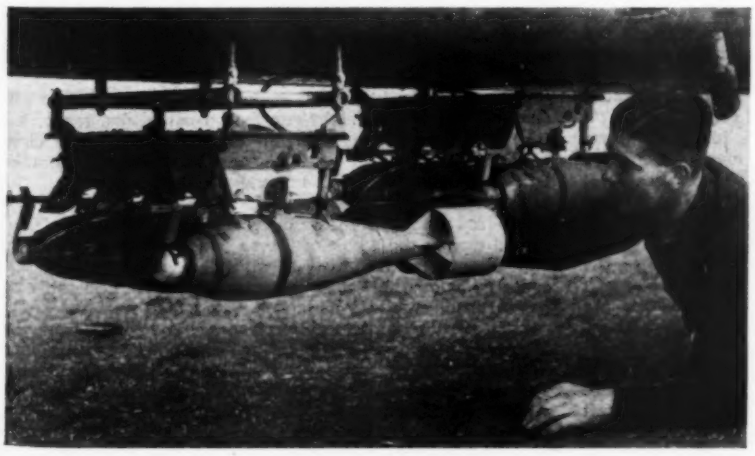
"I see no reason to give any specific assurances which would tend to impair the responsibility of his Majesty's Government to Parliament for the proper conduct of the war. It is my duty as Minister of Defence to review such questions from time to time in the light of current experience. I have come to the conclusion that while there is no need at the present time to change the position of the Coastal Command as part of the Royal Air Force, it is necessary that the Coastal Command should play a more important part than it has hitherto done in trade protection, and that for this purpose substantial increases, some of which have been already effected, will be necessary.

"Moreover, as the function of the Coastal Command squadrons is that of co-operation with the Royal Navy, the operational policy of the Command must be determined by the Admiralty, of course in consultation with the Air Officer Commanding-in-Chief. Excellent relations have been established since the war between the two Services, and the closest contact exists between the Naval and Air authorities. I am satisfied that the integrity of operational direction will be fully achieved."

The Balloon Barrage at Sea

CONVOYS run risks, too, when moving along the Channel, but it has been found that skilful use of barrage balloons towed on the ships greatly reduces that danger. The other day an officer of balloons who is engaged in this work broadcast an account of it. He gave a vivid description of an air attack on a convoy at dusk, but we will just quote his summing up of the situation. He said:—

"Before the war the waters round our shores were full of merchant vessels carrying what is known as coastwise traffic. They called, I suppose, at almost every port around our shores, picking up a cargo here, landing a cargo there. The particular coast traffic with which I am concerned is what is known as the Channel Convoy, and we help in escorting merchant vessels through the Straits of Dover and down the Channel. Before the collapse of France this was a reasonably easy task, but nowadays, you see, there is a certain difference of opinion between Mr. Winston Churchill and Adolf Hitler as to whom this stretch of water actually belongs. Now, as you know, the Navy are past-masters at escorting convoys; they



COASTAL COMMAND CONKERS: Loading the external racks of a Coastal Command Blenheim with an assortment of armour-piercing and general-purpose bombs. The armour-piercers are pointed.

WAR IN THE AIR (CONTINUED)

know every trick of the trade, and should Jerry's fertile imagination create some new situation which had not previously arisen, they would soon adapt themselves to deal with their novelty. One new situation that he has created, however, is that of the dive-bomber, and whereas this method of attack is in no way confined to this stretch of water, it is certainly much more likely to be met with than in most other parts. Now, a ship at sea, when all is said and done, is really a very small target, providing the attacking planes are not allowed to dive too low, and it is here where we of the Balloon Barrage do our bit. Each convoy is accompanied by vessels of the Royal Navy, carrying balloons; these are placed at vantage points amongst the convoy, thus, in a sense, the escorted vessels are placed inside a box, with the Navy acting as the walls and the balloons acting as a lid.

"You may wonder how efficacious are these balloons in a dive-bombing attack. Actually I have never spoken to a German pilot so as to know what they think of them, but I have discussed the subject on many occasions with our own pilots and they have invariably told me that they hate them like hell, treat them with the greatest respect, and avoid them like the plague. I must say that, from my own personal experience, when Jerry has made an attack on us, he seems to concur with our own pilots' views, as invariably he sends Messerschmitt 109s over first to attempt to shoot down the balloons, thereby making way for the dive-bombers following very close behind them. We have our own method of competing with those 109s, and I must say it seems extremely effective, as on many occasions the bombers have arrived only to find all the balloons still flying, with the result that dive-bombing has to be turned into precision bombing."

British Bombing of Germany

OF late the Bomber Command has shown rather more disposition to concentrate its bombing policy. It still feels it desirable to include a number of different targets in its nightly programme, doubtless acting on the wishes of the Ministry of Economic Warfare. There are some nights when it spends its chief efforts on aerodromes in occupied territory, hoping that well-placed bombs will reduce the weight of the enemy's attacks on Britain. For this temporary purpose bombs on runways, where such exist, or just on the landing ground may be very effective, and probably they are more effective if the craters are made after the machines have taken off. On returning, such machines will be directed to land at other places, but there is a good deal of trouble and some risk about making a change of that sort by night. And, of course, those craters do not prevent the machines in question from dropping their bombs on Britain.

Oil stores and refineries receive periodic attention, because to damage them is to hit Germany on one of her most tender spots. She depends to a considerable extent on synthetic petrol distilled from coal. Communications are other things which must not be left alone for too long. Even the Dortmund-Ems canal can be repaired by clever German engineers, and their efforts have to be restrained. But none the less, there has been a lot of concentration on such places as the Hamburg docks, and for a while we all got quite tired of reading about the marshalling yard at Hamm; it has not been mentioned so often of late. Cologne and Dusseldorf have been among the latest favourite targets, and the policy has been to visit them on a number of consecutive nights, or several times in a week. Next to Essen, Dusseldorf is the chief industrial centre of the whole Rhenish-Westphalian region, Germany's black country, in which so many of her heavy industries are crowded together. Dusseldorf is a town famous for its iron and steel foundries.

The results of a recent raid on Dusseldorf surprised those pilots who had already seen the work of the R.A.F. in this part of the Ruhr, and the crews of several aircraft agreed, when they came to talk it over afterwards, that they had never seen such fires before. The weather favoured the attack and also made it possible to take an accurate survey of the results of the raid. Visibility was very good and quite unimpeded by the scattered clouds over the city. The first of our aircraft arrived over the city shortly before 7 o'clock in the evening. It was the first of a powerful force detailed to attack the Press and Walzwerke blast furnaces and steelworks. These works produce, among other things, boiler bodies, ships' propellers and railway material. The pilot found his objective at once and his incendiaries started four large fires. The next pilot to arrive, a few minutes later, confirmed the first pilot's report that two large explosions followed the fires. With many parts of the steel works now well alight, the way for a mass attack was prepared. For over and hour the whole of this force concentrated on this objective. In all, nearly four thousand incendiaries were dropped as well as a very large number of heavy high explosive bombs.

Later News

THE exigencies of printing and publication at this season compel the adoption of something like the stop-press columns of the daily papers. Since the foregoing pages went to press, the Prime Minister has announced that the Army of the Nile has won a major victory, and from other sources it is learnt that over 20,000 Italian prisoners have been taken, together with quantities of war material. An Army's success can usually be measured by the number of prisoners and guns captured, and so there is no doubt that Marshal Graziani has been very soundly defeated. As Taranto assured the supremacy of the Royal Navy in the Mediterranean, so this battle of Sidi Barrani gives the Armies of the British Empire supremacy in Africa. One can imagine the jubilation in Abyssinia; and surely there will be rejoicing in the French African Empire at this downfall of the Power which clamoured insolently for Tunis, and afterwards stabbed the reeling France in the back. The following communiqué on the air side of the work has been issued by the Middle East Command:—

"Aerial activity was again intense in the Western Desert throughout yesterday (Wednesday, Dec. 11).

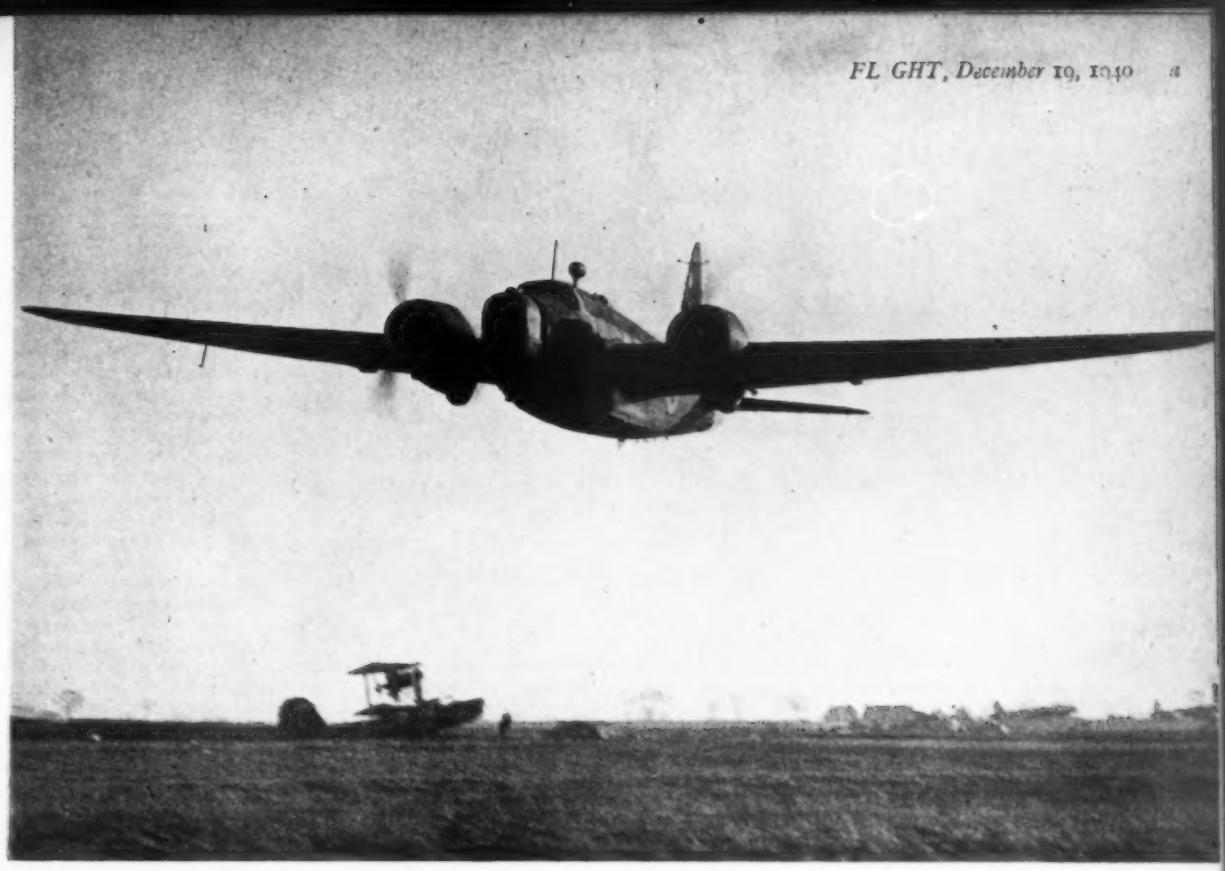
"Both bomber and fighter aircraft of the R.A.F. continued to support the army offensive by the incessant bombing of every Italian advanced aerodrome and by attacking enemy troops. Blackshirt troops in large numbers retreating from Half-way House (Buqbuq) to Sollum were heavily machine-gunned and thrown into utter confusion. In the same area a large quantity of mechanised transport was successfully bombed.

"Several tons of bombs were dropped on Sollum, while the enemy landing-grounds of Gambut, Aziez, Menastir, El Adem, El Gubbi, Derna, Tmimi, and Ain el Gatsala were raided during the day and a number of enemy aircraft dispersed on the ground were destroyed.

"R.A.F. fighter aircraft were also in action, and during the whole day were on constant patrol over our troops. Eight enemy aircraft were shot down—six confirmed and two unconfirmed. In addition one unidentified aircraft on the ground was destroyed, making a total of nine in all. Of these, one of our eight-gun fighter squadrons accounted for four destroyed for certain and two possible. They included one S79, three CR42s, and two Bredas. Another fighter squadron shot down one S79 and one CR42, the latter in flames.

"Throughout these intensive operations, which continued during the whole of the 24 hours under review, only one of our aircraft failed to return. One of our aircraft reported as missing in the communiqué issued December 10 has returned safely to its base."

A smaller, but interesting, piece of news comes from the Home front. The shell-gun or "cannon" has been in action mounted in the machines of the Fighter Command, and in a recent action a British pilot used it on a Me109, which exploded with all the appearance of the burst of an A.A. shell.



ALL IN : Wheels up, flaps up and bomb doors closed, a Wellington departs for Berlin with over a ton of bombs.

AT A WELLINGTON STATION

With the Berlin-strafers : A Happy Family Group

By Major F. A. de V. ROBERTSON, V.D.

A SENIOR officer of the Royal Air Force has called the Wellington "the best bomber in the world." The men who have to work in it and on it will certainly endorse that opinion. The type has been described often enough in *Flight*, but if one wants to learn the real place where a certain class or type of aeroplane stands one should visit the stations where it is at work and talk to the men who live or die with it. H.M. the King has recently visited a Wellington Group, and, to compare small things with great, so have the representatives of *Flight*.

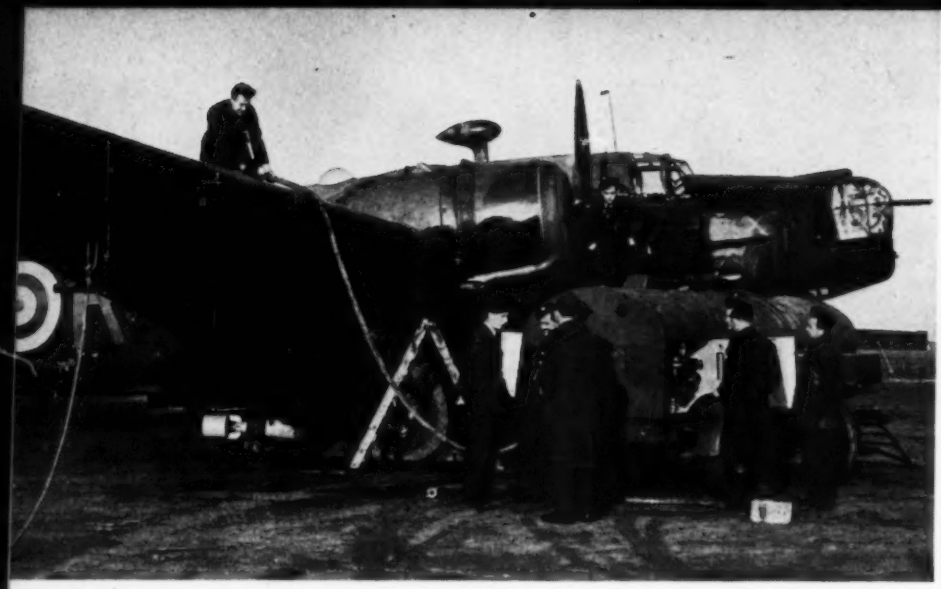
The R.A.F. Bomber Command now thinks very much in Groups. A bomber Group has a headquarters and so many stations, and on each station there may be one or more squadrons. There may be friendly rivalry between the squadrons on the same station, and also between the different stations. It is very desirable that it should be so, for there is nothing healthier than for a station to take a pride in saying to another station: "We bombed our targets more accurately than you bombed yours." But all the same the officers and men of each station usually know all the others in the same Group, and so the Group becomes a sort of great brotherhood, with the A.O.C. and his staff acting as parent to the whole family.

Incidentally, it is not too easy to find a Group H.Q. When the representatives of *Flight* reached a village which seemed to be in about the right place, we enquired from a yokel, who seemed as dully ignorant of everything connected with the Air Force as the typical yokel that one sees in farces on the stage. So we produced our Air Ministry passes, which he examined. Gradually a look of intelligence began to dawn on his hitherto vacant face, and he then apologised, explaining that he belonged to the Home Guard and had to be careful how he directed strangers, and then gave us clear instructions. There'll always be an England, and she will always be not quite such a fool as she likes strangers to think she is. We had met a piece of the real England.

That H.Q. is a cosy place with a happy family atmosphere, and the Group Press Officer made our paths straight. The A.O.C., an old acquaintance of *Flight's*, gave us his cordial blessing, and expatiated on the manifold

UNPOSED : A scene in the pilots' room ten minutes before the first machine takes off for Berlin.

AT A WELLINGTON



THE RIGHT SPIRIT: Refuelling a Wellington 1A ready for the night's raid.

good points of the Wellington. He had every point at his fingers ends.

There are many advantages in the geodetic construction. It will stand a lot of shooting about and may lose considerable chunks before the framework of the machine is materially weakened. The men of the Group have received expert instruction as to what members they may safely cut away if they want a hole through which to poke extra guns, or anything of that sort—though, to tell the truth, the gunners in a night bomber seldom have to fight off any opposition, and for the most part find a raid one long, dull, cold sit.

Among the squadrons in this Group was one which *Flight* had visited in past years at quite a different aerodrome and when its pilots were flying a very different type of heavy bomber. This squadron claims descent from an ancester which formed part of the Independent Air Force in 1918 and went forth in its D.H.9s and (later) D.H.9As to bomb military objectives in Mannheim, Mainz, and Metz-Sablons. They were bombing by day in those days, and they had to fight their way in and out against furious attacks by German fighter machines. In the present war this squadron has had day fighting to do, and claims that it was the first R.A.F. squadron to meet the Me 110 in deadly combat. Both sides have cause to remember that fight over the Heligoland Bight, when the Wellingtons suffered losses, but taught the Messerschmitts a wholesome respect for their power-operated turrets. The whole German theory of air defence went agley when it was found that fighters might lose more machines than the bombers lost in a pitched

STOP ME AND BUY ONE: A bomb train at one of our bomber aerodromes.

HAMBURGHER'S VIEW: (Left) the bomb compartment of the Wellington with doors open.

TATION (CONTINUED)

NOW CLOSING DOWN : Covering up the "works" of a Wellington 1A. The heating muff on the exhaust pipe and the dual landing lights in the wing can still be seen.

battle fought in daylight.

We talked with an officer of that squadron, who had recently been awarded the Distinguished Flying Cross, and who told us something about the doings of the squadron in the present war. Of course, the crews had spent the early months in learning their way over Germany while they dropped leaflets. Then when Norway was invaded they raided Stavanger three times. During the Battle of France the squadron did a great many raids, mainly attacking bridges in the rear of the Germans. The pilots would often find depots hidden in the woods, and would come down quite low to attack them. The air gunners enjoyed that, for they got a chance to let fly with their Brownings, whereas when the Wellingtons were doing precision bombing the gunners very seldom got a chance to pull trigger. There were some amusing incidents at times when a Wellington was on roving commission. More than once an observer thought he had spotted a convoy moving along a road, and when the pilot came down to investigate they found that what they had seen was the line of shadows cast by the rows of poplar trees which are used so much to hedge the roads in Northern Europe, and which are always a bit strange to British eyes. During the evacuation from Dunkirk the squadron got orders to knock down buildings in St. Omer so as to block the roads and impede the movement of German troops. Shades of 1914-18! Fancy the R.A.F. knocking St. Omer ot all places about in that fashion! In the old days it used to be the H.Q. of "Boom."

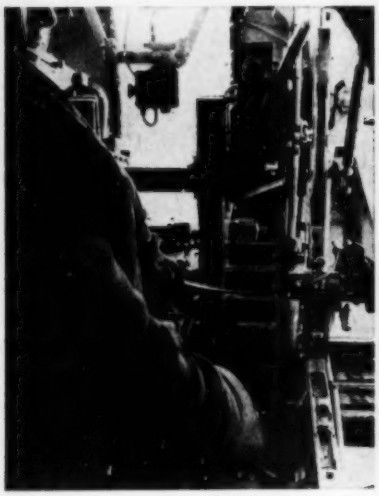
One evening the squadron was off duty, and officers and men had scattered to various places of harmless amusement, when messages were sent round to cinemas, theatres, public houses, and all such places of popular resort in the town, to say that the squadron was wanted urgently. The Army was having such a tough time over its evacuation that an S.O.S. had been sent out for the R.A.F. to send further squadrons to bomb the Germans. I forget how long it took for all ranks to assemble on the aerodrome, but it was a remarkably short time, and with equal speed the Wellingtons were got into the air, and hurried off to help the sister Service. The suffering infantry on the beaches probably did not see them hurrying to their help, but the Germans who were pressing on knew all about it.

Of course the Group has been busy on a lot of the regular targets in Germany. It knows Hamburg quite well, also

THE MORNING AFTER THE NIGHT BEFORE

Two views of the Wellington's tail gun turret showing how these "works," too, are protected from the weather when the machine is closed down.

AT A WELLINGTON STATION (CONTINUED)



FROM FRONT— Peeping into the nose turret we find the man who looks after trouble from the front end.

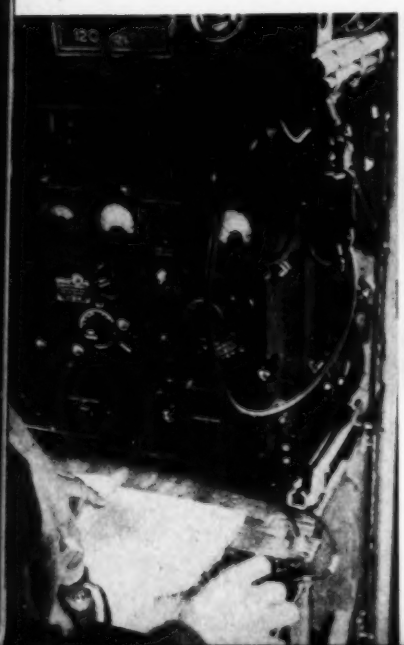
The second pilot is the aircraft's dog's body who spends most of the trip checking the course against the map.

First pilot and captain seen checking the fuel. On his self-discipline and resolution success or failure depend.

the Dortmund-Emms canal, Kiel and Essen. When the *Scharnhorst* had been damaged in a fight by H.M.S. *Renown*, this squadron and others sent out Wellingtons to scour the North Sea in search of her, but she turned back to Norway, and they did not find her.

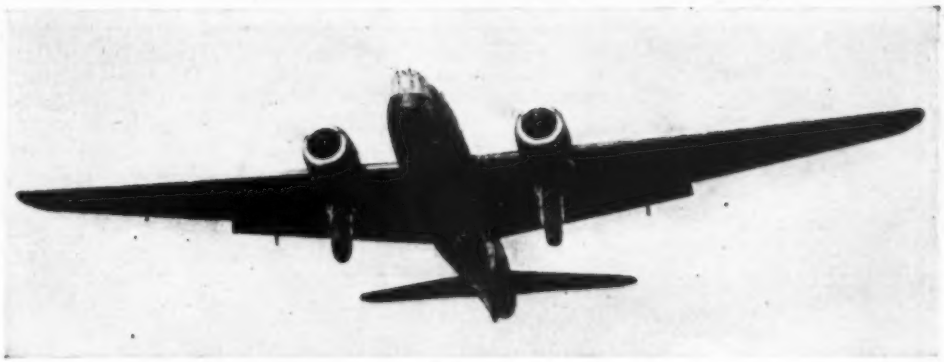
The bulk of the squadrons in this Group are ordinary R.A.F., manned by—to invent a term—United Kingdomers. But it has one unit of which the pilots are Czechs, and another which is mainly composed of New Zealanders. Pilots of the Royal New Zealand Air Force had come to this country to take delivery of Wellingtons and fly them back to their own country, but when the war broke out it was decided to keep them here. For a while they were rather lost, nobody's children, but then it was arranged that the Bomber Command should take them over and make them up to squadron strength by adding to them New Zealand personnel in the R.A.F. All the pilots, I believe, hail from that delectable Dominion, and a certain number of the airmen, but the establishment of the latter was made up by other Britons. So some of the pilots wear the initials N.Z. in the middle of their wings, while others do not, according to which Service they really belong. All receive R.A.F. rates of pay while in the Bomber Command. The Wing Commander who was the original C.O. of that squadron remained on active duty longer than any other C.O. in the Group. He has recently been ordered to take a rest on light duties, and is very much disgusted at having to do so. But he still remains with the Group. Quite a number of pilots who have been ordered to rest for a while from raiding are still employed in the Group, and they mostly itch to be once more out on the night flights, finding their way across Germany, dodging the *flak*, and watching the fires which their bombs have started in the target. There is a wonderful spirit in these bomber pilots. A crew usually does 30 raids before it is ordered to take a rest. The Group M.O. discussed the matter with me. He is very keen on making the air crews take vitamin A, which is said to improve vision at night. So far, it seems, the crews have not found that this medicine enables them to dispense with the use of parachute flares.

The N.Z. Wing Commander took me inside a Wellington, and one cannot help feeling amazed at all the devices for which the designer has to find a place. But one drawback struck me. There is a camp bed inside, and it seemed that it must be very difficult to get a wounded air gunner from his turret on to the bed. A convenient cat-walk



—TO REAR: (Left) The wireless operator is located just behind the pilot, a most important member of the team. (Centre) On the navigator falls the burden of finding the way in all weather conditions. (Right) Remote from his team mates the rear gunner's life at times depends on his sure aim.

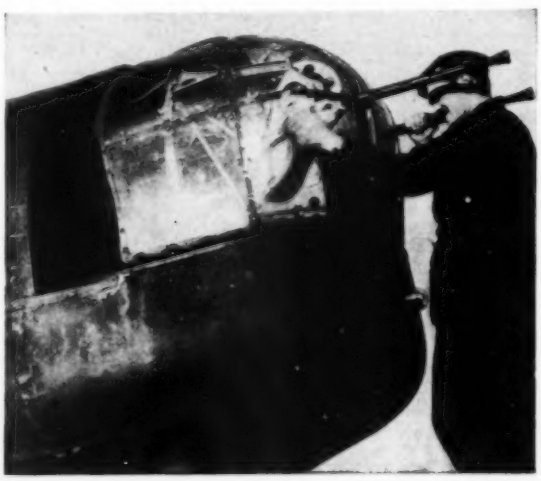
AT A WELLINGTON STATION (CONTINUED)



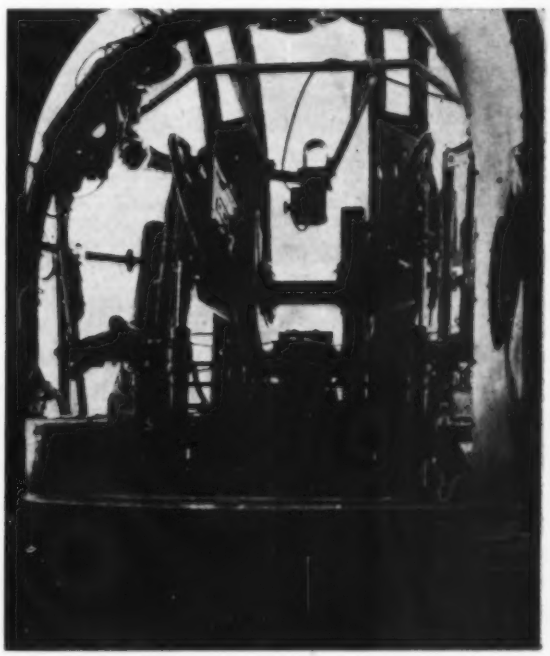
UNSPOILT: Even with wheels and flaps down for landing, Wellington retains its handsome outlines.

seems a very desirable thing which is not there; so I throw out this idea as a suggestion to give further worries to those marvellous men the designers.

In the evening I was out on one of the aerodromes of the Group as the sun was sinking in a glorious red sky. A squadron whose remote ancestor had belonged to the R.N.A.S. was sending out Wellingtons to raid Berlin and Cologne. In 1918 this squadron was flying Handley Page o/400 bombers during the final German advance and the Allied riposte which ended the war. The H.P. was then the only, and therefore the best, heavy machine in active use by the R.A.F., and it was fitting that the squadron should now be flying Wellingtons. There was nothing tense about the appearance and bearing of the crews as they got ready for their adventure. They were much more interested by the operations of the *Flight* photographer than in considerations of what adventures lay before them. But to the civilian onlookers, albeit old soldiers of the last war, there was a distinct thrill in seeing each crew clamber up the ladder into the throat of the Wellington, and then the big, shapely machines running smoothly across the aerodrome and rising gracefully into the air, black silhouettes against the dying crimson of the sky. There is nothing sinister in the appearance of the Wellington, but no doubt the German war machine regarded them as something out of the Nazi version of hell when they reached their objectives some hours later. By next morning they had all got safely home.



A HELPING HAND: The rear gunner helps the front gunner to clean his windows.



FRONT GUNS: (Right) A view from the bomb aimer's compartment through the nose turret. The breech blocks of the two Brownings are shown one each side of the reflector sight. The flash bulb up in the left top corner is only used to warn the crew to abandon plane. There is one in each position.

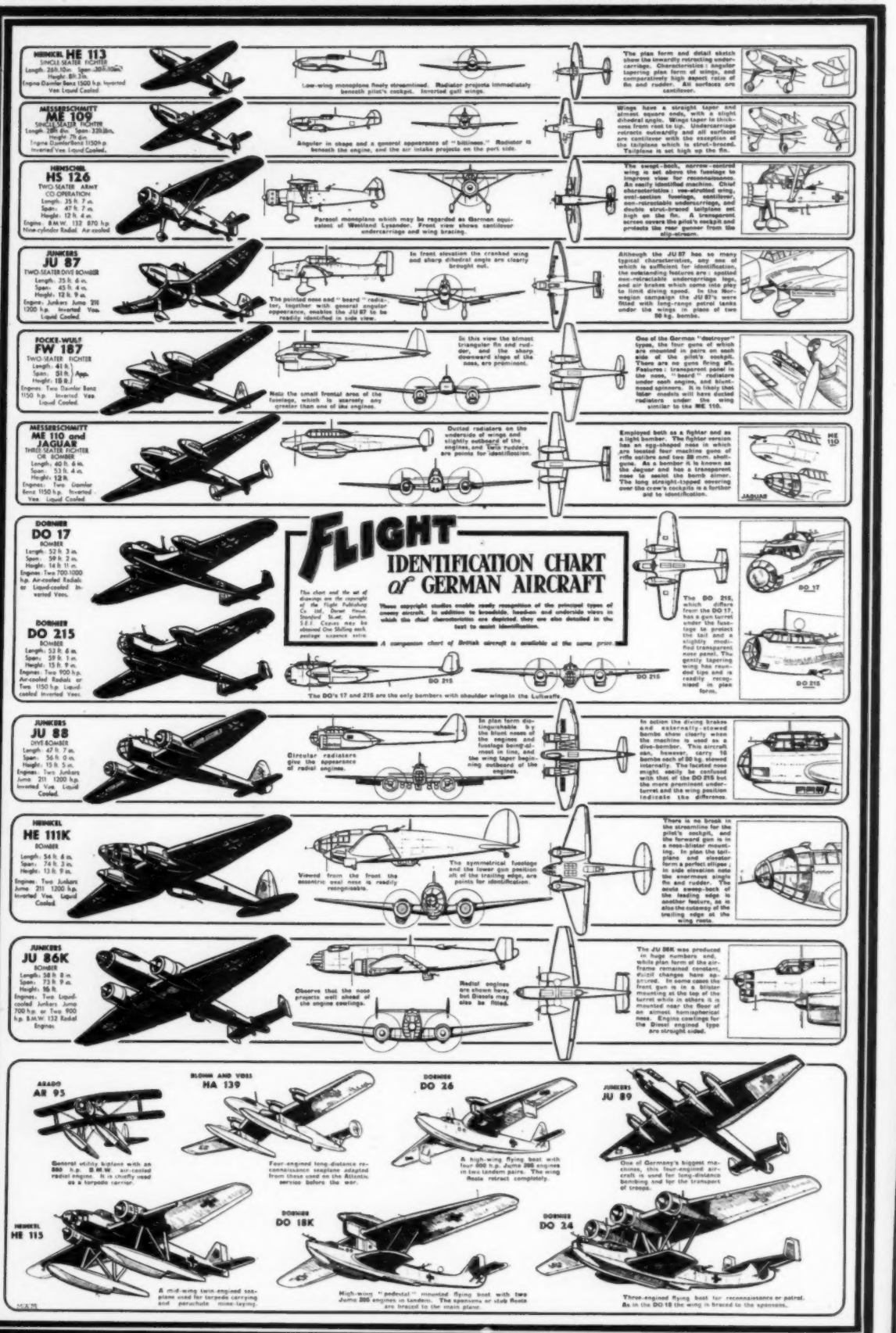
Scottish Airways

THE aircraft of Scottish Airways fly on the following regular routes: Inverness-Wick-Kirkwall-Shetland, Glasgow-Campbeltown-Islay, Glasgow-Tiree-Barra-Benbecula-North Uist, Glasgow-North-Uist-Stornoway. These routes are almost identical with pre-war ones; in fact, the extension to Stornoway is a new service. In addition, the company continues to operate their well-known air ambulance service and have carried a number of serious cases between the isolated Western Isles and Glasgow. The total route mileage covered is about 800 miles.

Five-year-old D.H.86

AFTER five years' service, in which it has flown more than 1,000,000 miles, the Qantas-Empire Airways DH86 airliner, *Melbourne*, has been handed over to the Royal Australian Air Force. The *Melbourne*, which pioneered the Empire air-mail service in 1935, has never had a crash or forced landing. This is a wonderful record for a transport craft with five years' service. Until the flying boat service began in July, 1938, the *Melbourne* and four other DH86 planes flew mail between Brisbane and Singapore. Since then the *Melbourne* has been on the inland service from Brisbane.

NEW "FLIGHT" CHART OF GERMAN AIRCRAFT


HENSCHEL HS 126
TWO-SEATER ARMY CO-OPERATION
Length. 35 ft. 7 in.
Span. 47 ft. 7 in.
Height. 12 ft. 4 in.
Engine. B.M.W. 132 870 h.p. Nine-cylinder Radial. Air-cooled.
Parasol monoplane which may be regarded as German equivalent of Westland Lysander. Front view shows cantilever undercarriage and wing bracing.
JUNKERS JU 87
TWO-SEATER DIVE BOMBER
Length. 35 ft. 6 in.
Span. 45 ft. 4 in.
Height. 12 ft. 9 in.
Engine. Junkers Jumo 211 1200 h.p. Inverted Vee. Liquid Cooled.
The pointed nose and "beard" radiator, together with general angular appearance, enables the JU 87 to be readily identified in side view.
In front elevation the cranked wing and sharp dihedral angle are clearly brought out.
Although the JU 87 has so many typical characteristics, any one of which is sufficient for identification, the outstanding features are: spatted non-retractable undercarriage legs, and air brakes which come into play to limit diving speed. In the Norwegian campaign the JU 87's were fitted with long-range petrol tanks under the wings in place of two 50 kg. bombs.
FOCKE-WULF FW 187
TWO-SEATER FIGHTER
Length. 41 ft.
Span. 51 ft. Approx.
Height. 10 ft.
Engines. Two Daimler Benz 1150 h.p. Inverted Vee. Liquid Cooled.
Note the small frontal area of the fuselage, which is scarcely any greater than one of the engines.
In this view the almost triangular fin and rudder, and the sharp downward slope of the nose, are prominent.
One of the German "destroyer" types, the four guns of which are mounted in pairs on each side of the pilot's cockpit. There are no guns firing aft. Features: transparent panel in the nose, "beard" radiators under each engine, and blunt-nosed spinners. It is likely that later models will have ducted radiators under the wing similar to the ME 110.
MESSERSCHMITT ME 110 and JAGUAR
THREE-SEATER FIGHTER OR BOMBER
Length. 40 ft. 6 in.
Span. 53 ft. 4 in.
Height. 12 ft.
Engines. Two Daimler Benz 1150 h.p. Inverted Vee. Liquid Cooled.
Ducted radiators on the undersides of wings and slightly outboard of the engines, and Twin rudders are points for identification.
Employed both as a fighter and as a light bomber. The fighter version has an egg-shaped nose in which are located four machine guns of rifle calibre and two 20 mm. shell-guns. As a bomber it is known as the Jaguar and has a transparent nose to assist the bomb aimer. The long straight-topped covering over the crew's cockpits is a further aid to identification.
ME 110
JAGUAR
DORNIER DO 17
BOMBER
Length. 52 ft. 3 in.
Span. 59 ft. 2 in.
Height. 14 ft. 11 in.
Engines. Two 700-1000 h.p. Air-cooled Radials or Liquid-cooled Inverted Vees.
DORNIER DO 215
BOMBER
Length. 53 ft. 6 in.
Span. 59 ft. 1 in.
Height. 15 ft. 9 in.
Engines. Two 900 h.p. Air-cooled Radials or Two 1150 h.p. Liquid-cooled Inverted Vees.
FLIGHT
IDENTIFICATION CHART of GERMAN AIRCRAFT
This chart and the set of drawings are the copyright of the Flight Publishing Co. Ltd., Dorset House, Stamford Street, London, S.E.1. Copies may be obtained One Shilling each, postage sixpence extra.
Whose copyright studies enable easily recognition of the principal types of enemy aircraft. In addition to broadside, headon and underside views in which the chief characteristics are depicted, they are also detailed in the text to assist identification.
A companion chart of British aircraft is available at the same price.
The DO 215, which differs from the DO 17, has a gun turret under the fuselage to protect the tail and a slightly modified transparent nose panel. The gently tapering wing has rounded tips and is readily recognised in plan form.
DO 17
DO 215
The DO's 17 and 215 are the only bombers with shoulder wings in the Luftwaffe.
JUNKERS JU 88
DIVE BOMBER
Length. 47 ft. 7 in.
Span. 56 ft. 0 in.
Height. 15 ft. 5 in.
Engines. Two Junkers Jumo 211 1200 h.p. Inverted Vee. Liquid Cooled.
Circular radiators give the appearance of radial engines.
In plan form distinguishable by the blunt noses of the engines and fuselage being almost in line, and the wing taper beginning outboard of the engines.
In action the diving brakes and externally-stowed bombs show clearly when the machine is used as a dive-bomber. This aircraft can, however, carry 16 bombs each of 50 kg. stowed internally. The faceted nose might easily be confused with that of the DO 215 but the more prominent undertunnel and the wing position indicate the difference.
HEINKEL HE 111K
BOMBER
Length. 54 ft. 4 in.
Span. 74 ft. 3 in.
Height. 13 ft. 9 in.
Engines. Two Junkers Jumo 211 1200 h.p. Inverted Vee. Liquid Cooled.
Viewed from the front the eccentric oval nose is readily recognisable.
The symmetrical fuselage and the lower gun position aft of the trailing edge, are points for identification.
There is no break in the streamline for the pilot's cockpit, and the forward gun is in a nose-blister mounting. In plan the tailplane and elevator form a perfect ellipse; in side elevation note the enormous single fin and rudder. The acute sweep-back of the leading edge is another feature, as is also the cutaway of the trailing edge at the wing roots.
JUNKERS JU 86K
BOMBER
Length. 58 ft. 8 in.
Span. 73 ft. 9 in.
Height. 16 ft.
Engines. Two Liquid-cooled Junkers Jumo 700 h.p. or Two 900 h.p. B.M.W. 132 Radial Engines.
Observe that the nose projects well ahead of the engine cowlings.
Radial engines are shown here, but Diesels may also be fitted.
The JU 86K was produced in huge numbers and, while plan form of the airframe remained constant, detail changes have appeared. In some cases the front gun is in a blister mounting at the top of the turret while in others it is mounted near the floor of an almost hemispherical nose. Engine cowlings for the Diesel engined type are straight-sided.
ARADO AR 95
General utility biplane with an 880 h.p. B.M.W. air-cooled radial engine. It is chiefly used as a torpedo carrier.
BLOHM AND VOSS HA 139
Four-engined long-distance reconnaissance seaplane adapted from those used on the Atlantic service before the war.
DORNIER DO 26
A high-wing flying boat with four 600 h.p. Jumo 205 engines in two tandem pairs. The wing floats retract completely.
JUNKERS JU 89
One of Germany's biggest machines, this four-engined aircraft is used for long-distance bombing and for the transport of troops.
HENSCHEL HE 115
A mid-wing twin-engined seaplane used for torpedo carrying and parachute mine-laying.
DORNIER DO 18K
High-wing "pedestal" mounted flying boat with two Jumo 205 engines in tandem. The sponsons or stub floats are braced to the main plane.
DORNIER DO 24
Three-engined flying boat for reconnaissance or patrol. As in the DO 18 the wing is braced to the sponsons.

A new identification chart prepared from *Flight* copyright drawings is now available. Its size is 14½in. × 22in., price 1/-, plus 6d. postage on single copies or 7d. on quantities of six or less.

HERE and THERE

A Strong Team

THE Hawker team of test pilots, with "George" Bulman at its head, now includes two more pilots well known to readers of *Flight*. Captain Hubert Broad joined the firm some months ago from the Royal Aircraft Establishment, and Mr. W. Humble, a keen competitor in many King's Cup races, is another member of the team.

Slow Air Mails

REPLYING to a question in the House the other day, the Postmaster-General (Mr. W. S. Morrison) said he was aware that during the past month the transatlantic air mail had sometimes taken longer than surface mails, due to the irregular operation of the air services. If there was no improvement in the future, the question of stopping the service would certainly be considered.

A Grahame Heath Spitfire

MR. G. F. HEATH, a director of the well-known Rootes firm and some of its subsidiaries, has presented to the Ministry of Aircraft Production a cheque for £5,000 wherewith to buy a Spitfire. The machine is to be named *Grahame Heath*, in memory of his eldest son who was killed in the last war at the age of 18½. It is to be allotted to the squadron of the R.A.F. in which the younger of two surviving sons, F/O. Barrie Heath, is now serving. There seems to be a possibility that the machine may be flown by him.

Kelly's Once More

IN spite of difficult conditions, the twentieth edition of Kelly's Directory of the Leather Trades has recently been published. It gives a list of names of those engaged in the leather and allied trades in England, Scotland and Wales. The book is divided into three sections, in each of which the information is given in alphabetical order. The sections deal with places, an alphabetical classification of trades in London, and a similar classification for the rest of the country. The price is 42s. 6d., and copies can be obtained from local booksellers, or direct from Kelly's Directories, Ltd., 186, Strand, London, W.C.2.

Australian Bombing and Gunnery School

THE first Australian bombing and gunnery school to be formed for the Empire Training Scheme is now well in operation. It was opened some months ago at Evan's Head, New South Wales. Both air observers and air gunners pass through the school to receive armament training courses of eight weeks and four weeks respectively. Pilots from the Service flying training schools will also come to the school for a two-weeks' course at the end of their flying training. The first air navigation school is now due for opening also. This will be at Parkes, N.S.W., and will teach all navigation, including astronomical.

International Air Force

SPEAKING at a luncheon of the National Defence Public Interest Committee in London last week, Mr. Herbert Morrison said that never again should it be possible for a thug with an air force to terrorise a continent. We should, when the war was won, seek a co-operative system controlled by an international air police force, which would discharge for Europe and the world functions similar to those of the police in this country in maintaining order among the civil population.

The idea is neither very new nor very practicable.

That Blitzkrieg

THE London correspondent of the Swedish newspaper *Svenska Dagbladet* has visited the Southampton and Portsmouth areas and writes to his paper that he is surprised at the small damage done and at the speed with which normal life returned. He concludes that "no bomb attack can break down the British people." This is in somewhat striking contrast to the attitude of the Swedish aviation journal *Flygning*, the official organ of the Swedish Aero Club, the leading articles in which have given a strong impression of pro-Germanism, or at least of anti-British views. Possibly it is significant that the full-page advertisement of the Bristol Aeroplane Co., Ltd., seems to have disappeared from the inside back cover of *Flygning*.

THE GREEKS HAD A WORD FOR HIM: Il Duce as an intrepid birdman. Although the turtle emblem has a certain significance, a flounder would be more appropriate.

Christmas Greeting from Germany

FROM Sgt./Pilot T. Kevin May, R.A.F., a prisoner of war at *Stalag Luft* Camp, Germany, we have received a letter requesting us to publish the following message, a request with which we comply with the very greatest pleasure: "The N.C.O.'s and airmen of the R.A.F., now prisoners of war in Germany, at the Stalag Luft camp, send to their comrades in the messes of the R.A.F., and to their friends in England, Christmas Greetings and Good Wishes."

Military Orders in U.S.A.

DURING the first fortnight of November contracts to the value of over $490 million were let for military aircraft for the Army and the Navy. This is over £120 million and includes what *American Aviation* thinks to be the largest order ever placed in U.S.A. This goes to Glenn Martin for between 500 and 600 patrol bombers, and the order totals over $106 million (£26 million), being an average price of round about £50,000 each. Particulars of the contracts follow:—

Ford Motor Co.:	
4,000 Pratt & Whitney engines (War Dept.)	$122,323,020
Wright Aeronautical Corp.:	
Radial engines (War Dept.) ...	119,870,920
Pratt & Whitney:	
Engines (Navy Dept.)	59,490,704
Engines (Navy Dept.)	41,886,581
Wright Aeronautical Corp.:	
War and Navy engines	11,436,042
Total for engines	$355,007,267
Glenn L. Martin Co.:	
500 to 600 patrol bombers (Navy Dept.)	$106,125,396
Vought-Sikorsky Aircraft:	
(Navy Dept.)	28,679,070
Vultee Aircraft:	
(War Dept.)	327,792
Total for aircraft	$135,132,258
Grand Total	$490,139,525

Air crews enjoying a light lunch after a trip to Tobruk in Blenheims.

THE SLIP-WING FIGHTER

Its Relation to the Slip-wing Bomber : Speed or Manœuvrability : A Reply to Our Correspondents

By NOEL PEMBERTON-BILLING

IN the course of an article describing the Slip-wing bomber in a recent issue of *Flight*, I made the somewhat provocative statement that, by the use of high wing loading, it would always be possible to build a bomber faster than a fighter. Mr. Lacy and a number of other people have suggested, in letters to the Editor, that by applying the slip-wing principle to the fighter also, it will be possible to beat the bomber. I still hold to my original statement ; but let me amplify it a little.

I do not deny that the fighter also can utilise the slip-wing to give it a high wing loading, but it cannot expect to gain so much from it. Most of the extra load of bombs and fuel that the slip-wing enables the bomber to carry must be got rid of before a landing can be made, or a fighting performance attained. The load that the fighter can use up in the same way is relatively small—a few cwt. of fuel and ammunition. Thus, if the weight of the fighter for landing, with fuel and ammunition gone, gives it a wing loading of, say, 35 lb./sq. ft., then adding these items for take-off will not put up the loading to more than about 40 lb./sq. ft., so that, in view of its low power-loading, the fighter should be able to take off unassisted with as much load as it needs for short-range work. To put up the loading any further by cutting down the wing would make the landing speed dangerously high, besides destroying the necessary manœuvrability. For the long-range fighter, where a big fuel load is necessary, the slip-wing becomes worth while, enabling fuel to be added almost *ad lib.* for whatever range may be required. An even more useful development of the slip-wing for fighter patrols will be described in a later article.

The See-Saw of Speed

We can now go on to consider the maximum speed that the fighter can attain, as compared with the bomber. First of all, let me point out that in saying that it would always be possible to build a bomber faster than a fighter I did not mean that the particular design illustrated would always be faster than any fighter. Its maximum speed of 460 m.p.h. is nearly 100 m.p.h. faster than any existing enemy fighter, and I believe this to be sufficient margin for the present. But when the enemy have succeeded in building a 460 m.p.h. fighter, then it will be necessary to cut down the size of our bomber until once more it has the necessary margin of speed. This is a process that cannot be applied to fighters. It will always be possible to give the bomber this margin of speed because it requires neither manœuvrability nor drag-producing armament, whereas the fighter must have at least one, if not both. The fighter can either be a single-seater with fixed and buried guns (in which case it cannot use them without having manœuvrability) or it can be heavily loaded and unmanœuvrable, in which case it must have rotatable gun turrets ; and even then a certain amount of turnability is necessary.

Let us consider the manœuvrable type first. To be really manœuvrable it must not have wing loading greater than 30 lb./sq. ft. (The present fighters are about 24-26 lb./sq. ft. ; hence their dramatic successes over the German types, which were handicapped by their higher loading of about 32 lb./sq. ft.) With such a low wing loading as this, I do not believe it possible to build an adequately equipped fighter capable of much over 400 m.p.h. I have a pusher design of my own, which is estimated to do 420 m.p.h. on 1,250 h.p. with about 30 lb./sq. ft. loading, and I do not think anyone is going to get a manœuvrable fighter much past that figure. Mere increase in engine power will not do it. It only puts up the weight, and consequently the size and so on, and the net effect of doubling the power is to produce about 10 m.p.h. more speed.

It is therefore fairly obvious that the fixed-gun manœuvrable fighter cannot give us the speed. Even if the ability of the pilot to aim his guns is sacrificed for speed by putting the loading up to about 40 lb./sq. ft., 500 m.p.h. is about the upper limit attainable by this type, and at that speed and loading it is not going to be very aerobatic.

Gun Turret Drag

The only alternative is the unmanœuvrable fighter with individually manœuvrable guns. Here it is the resistance of the gun turret that will prove the limiting factor. Taking the smallest and fastest highly loaded two-seater fighter that it proves possible to build, let us compare it with a bomber of the same wing area and the same engine power. The empty weights should be very much the same. The bomber will have a higher structure weight, as it will be required to work at a slightly higher loading, but this will be compensated by the weight of the gunner, the gun, and its turret in the fighter. The problem therefore resolves itself into a question of which will have the greater drag or resistance. The wings and tail surfaces can be exactly the same, but the bomber will be able to have a much better streamlined fuselage. It need be nothing but a perfectly streamlined unbroken airship shape. In order to keep down its "wetted area" it may be necessary to reduce the fuel load and bomb load inside to the amount that can be contained in a fuselage of a cross-sectional area decided by the requirement of the pilot, and a length decided by the tailplane lever arm. This means that it will be impossible to make the fighter fuselage any smaller, and it has the extra drag of the guns and their turret. I think any aerodynamics expert will agree with me that the drag of a gun turret in action will make at least 50 m.p.h. difference in speed when flying at around 500 m.p.h. It can be streamlined with retractable fairings when it is not in use, but it must be exposed when firing, and that is the time when it needs the speed. And even when the fairings are in place, the drag caused by the unavoidable cracks is likely to be very great at high speeds, as evidenced by the fact that some types of retractable undercarriage cause so much drag from this effect that they show little or no improvement over fixed legs with efficient fairings.

Any such excrescence as a gun turret will cause a premature appearance of the compressibility "burble" at a speed probably less than 500 m.p.h., and all the King's men and all the King's horse-power will not get it past that speed, whereas it will be possible to design the bomber so that no part of it reaches its critical speed before the limit set by the "shock stall" of the wings

THE SLIP-WING FIGHTER (CONTINUED)

themselves, and it should prove possible to postpone that until around 600 m.p.h.

Another difficulty in connection with building a heavily loaded fighter is that, although it may be the best type for attacking very heavily loaded bombers, it will be at a disadvantage when it meets other types, and a fighter must be prepared to fight other types of fighters. If the heavily loaded fighter should attempt to take on fighters of the Spitfire class, its lack of manœuvrability would prove a fatal disadvantage in spite of its superior speed.

Thus, although I still believe that I can build a bomber 50 m.p.h. faster than anyone else can build an effective fighter, I do not think that the unarmed bomber is very seriously menaced, even if the enemy should manage to build a fighter as fast. Even then, it means that the fighter must be at exactly the right height and position before it has any chance of success, and the chances of it being in this position when the bomber comes over are almost as poor as the A.A. gunners' chance of having a shell in the right place to meet the bomber, and judging by the results of our anti-aircraft fire, the odds against that are very great indeed. It must be remembered that at present our fighters are 100-150 m.p.h. faster than the enemy's bombers.

(Next week: The Night Patrol Fighter.)

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

BLACK AND WHITE TRAILS

Another Case Reported

WITH reference to Mr. Miller's letter in your issue dated November 9, it may be of interest to report that at 2.15 p.m. recently a Spitfire approaching from the north-west was first picked up by a black trail. This 'plane passed through a light haze whilst overhead and was lost to view, but reappeared shortly afterwards to the south-east, leaving a pure white trail. As the 'plane was flying at 25,000ft. I feel sure Mr. Miller will agree that this trail could not have been caused by the exhaust.

H. N. PARTRIDGE

Bishops Stortford.

THE LONG-RANGE BOMBER

A Mayo Composite Suggestion

AS an engineer, but a layman regarding aeronautical design, I am extremely interested in the articles in *Flight* which contemplate the long range, heavy bomb-load bombers of the future.

May I be permitted the following observations:—

(1) A long-range, heavy-bomb-load-carrying plane could employ the Short-Mayo composite construction.

(2) Assuming such type of construction, the lower and larger part, which for future reference we will call "A," should be used for carrying a huge and well distributed bomb or mine load. Part "A," should, in effect, be a flying bomb-rack, with suitable engines, petrol supply tanks, etc., and with controls operative from the top or smaller part, which for future reference we shall call "B."

Part "B" should be a long-range "fighter" type aircraft, carrying the minimum crew for carrying out the bombing operation. This bombing operation would be, after, of course, locating and making sure of the target, to put the complete aircraft in a dive at the target, i.e., *aim the complete aircraft*. When this has been done, and the aim checked, the controls on Part "A" should be locked from Part "B" to ensure the maintenance of the directional aim or dive of this part "A" on to the target, and then part "B" should be released, to return to base, after checking up on the hit.

It may be arranged that the petrol supply for part "B" is only used for the *return* journey, upon which journey, it being, in effect, a fighter as regards speed and armament, it should have fair passage, and capable of dealing with interception by enemy fighters. It is, of course, assumed that the bombing operations referred to are carried out at night, but it may be possible, with the future development of the long range fighter, to give escort for daylight operations.

The main points of my proposed arrangements are, however:—

(1) That the maximum possible bomb-load could be carried.

(2) That by "aiming the bomb-load" accuracy must be established.

(3) With the foregoing combination, the effect of the impact of the bomb-load *on a vital and selected* enemy target would be enormous, especially if the effects were enlarged upon very shortly afterwards by "standard" bomber attacks.

It should be emphasised that extremely vital targets be selected, and the employment of the bomb treatment which I have suggested should ensure the erasure of that particular target, whether armament works, docks, marshalling yard, factory, oil-refining plant, etc. The fact that that an air frame and engines are scrapped in the process should not be a deterrent to the plan, as these could be "just good enough" for the job, and in any case, the result aimed at, if successful, would be well worth such "extravagance."

With the aeroplane arrangements as set out above, it would seem that difficulties with regard to weight "balance" before and after release of the bomb load would be overcome as a similar problem has been overcome in the case of the Short-Mayo Flying Boat, and I cannot see any insurmountable difficulties with the necessary remote-control gear, etc.

E. A. PAGET.

SPEEDS OF BOMBERS AND FIGHTERS

How the Former Can Score

YOU tend to agree with your correspondent, Mr. Lacy, that the bomber must always be a little slower than the fighter. I support Mr. Pemberton-Billing's theory.

If I remember aright, the latter's statement implied that a bomber, designed with speed as the only defence, would be faster than a fighter, for which manœuvrability is imperative. Mr. Lacy presupposes armament for the "P-B" machine, whereas its designer specifically states that armament is eliminated. Consequently your correspondent's comparison with machines of the Heinkel IIIK class is invalidated. The German effort does not "go the whole hog." P-B's bomber is designed solely for speed. The defensive fighter which will be sent against it must inevitably be slower so that it may manœuvre with reasonable ease.

But I do most heartily endorse Mr. Lacy's thanks for your publication of this "stimulating article," which is in keeping with the progressive spirit always displayed by your paper.

A. CONWAY.

Manoeuvrability not Imperative

I HAVE read with interest the articles by Mr. Pemberton-Billing, but am afraid I cannot agree with his theory that bombers can always be faster than fighters because fighters require a high degree of manœuvrability.

It seems to me that a fighter, of a type similar to the Defiant in fighting equipment, would make an excellent counter to the PB29 bomber. It need not be any more manœuvrable than the bomber, since its only task is to overtake the enemy, fly alongside, and shoot him down. As it must be smaller than the bomber, then it can be faster.

The only requirement for this type of fighter is superior speed and a high rate of climb. The latter is more essential than ever as the PB29 is a "stratosphere ship."

If it is not possible for the fighter to reach the desired height to intercept the bomber on its way in, it should be possible to attack it on its way home, as route home will be easier for Fighter Headquarters to determine than route in, or objective. Certainly it has its disadvantages of allowing

CORRESPONDENCE (CONTINUED)

the bomber to do damage before it is forced down, but it always means one less to attack next time.

The fighter attack could be done from any angle by a "hotted up" Defiant, or might even be done head-on by Spitfires or Hurricanes. ROSS INGRAM.

AIRSCREW SPINNERS

A Difference of Opinions

AS pioneers of spinner development for variable pitch airscrews in this country, we were naturally extremely interested in the two articles by Messrs. Marshall and Burton in your issues of November 21 and December 5, but, among the many interesting points discussed in these articles, some statements were made which are so conflicting with our experience of spinners, that it seemed worth while bringing them to your attention.

The most important of these is the discussion of resilient mountings for spinners, the development of which was pioneered by de Havillands. While the article admits that resilient mounting has been done successfully, it suggests that there is a definite limit to the diameter of a flexibly mounted spinner and that a rigid spinner is probably better, irrespective of size. Our own experience shows the exact opposite. We know of at least six fatigue failures of rigidly mounted spinners, either on bench test or in flight, some of the spinners having been of our own early designs, but most of them being of the V.D.M. type as made by Messrs. Constant Speed Airscrews. Incidentally, this list includes one failure of a Merlin engine, on which it is stated in the article that the rigid spinner has proved its ability to stand up to the conditions of vibration. Our experience of flexibly mounted spinners has been extremely satisfactory and we have had no indication that, as suggested in the article, there is any limit in diameter above which flexible mountings cannot be used. We have flexibly mounted spinners, well over the 30 in. diameter limit proposed by Messrs. Marshall and Burton, which are now flying with complete satisfaction.

Tuned Flexible Mountings

Our very extensive vibration research on a large number of different airscrew-engine combinations, has shown that torsional vibration is present to a greater or lesser extent in all applications, and our stress records, as well as the fatigue failures which we have experienced on rigid spinners, all show that such vibrations can well set up extremely high fatigue stresses in the spinner, so that only by using suitably tuned flexible mountings can vibration be avoided.

Messrs. Marshall and Burton do admit in one point of the article that vibrations of various categories originating from the engine, airscrew and aircraft, have made it necessary in some cases to protect the spinner by flexible mountings, which is interesting when read in conjunction with our arguments in favour of flexibly mounted spinners, and a letter which de Havilland received from Constant Speed Airscrews in April, 1938, objecting in principle to flexible mountings, remarking that the use of a backplate rigidly mounted on to the hub barrel bolts, was among the outstanding features of the V.D.M. standard spinner design, and concluding by saying:

> "You have pointed out the existence of a torsional vibration as the reason for the incorporation of the Silentbloc sleeves, and the fluctuations of the engine have been given by you as the direct cause of this vibration. We are not familiar with this type of vibration, however, as it does not occur on the airscrew and unit manufactured by us, and we can only assume that hunting of the constant speed unit, when the engine is high revving, is causing fluctuations in speed, but we shall be pleased to receive your remarks on these points."

The suggestion of high stresses in rubber bushes used for resilient mountings is also perhaps rather misleading. The pre-loading of a rubber bush may be compared with the pre-loading of, say, a ball-bearing, which, in certain cases, is a highly desirable feature. It certainly cannot be considered as causing undue stresses. In practice, the rubber mountings used on our spinners have been found to stand up extremely satisfactorily and it is very rare for a rubber mounting to have to be changed even after many hundreds of hours' flying.

As is pointed out in the article, it is not possible to take a standard stiffness of mount and apply it indiscriminately to all types of designs. It is nevertheless possible, by a careful consideration of the characteristics of each individual spinner and engine, including such points as the number of rubber blocks used and their radial distance from the centre of the spinner, to cover a very wide range of spinners with a very small number of different types of blocks. The same blocks are actually used in spinners for engines as different as the Gipsy XII, Mercury and Hercules.

Elsewhere in the article Messrs. Marshall and Burton criticise independent locking at several points on the score that some of the locks may not be properly done up. The de Havilland rapid-release spinner which incorporates locking at a number of points was designed originally with a view to avoiding the payment of royalties for the use of V.D.M. patents to a nation which, at that time, was only a potential enemy. Despite the absence of one-operation locking, they have given particularly satisfactory results in service. Cases have been reported where machines have been flown with some of the locks incorrectly fastened, but among all the thousands of spinners of this type which have been flying, we have never heard of any accident or forced landing of any aeroplane due to this cause.

Spoke Mountings

Part 2 of the article appearing in your issue of December 5 discusses spoke mountings for spinners. The main advantage claimed for this type of mounting is that it improves accessibility of accessories mounted on the front of the engine. While this is undoubtedly a desirable feature, it is unfortunately complicated by the fact that practically every modern in-line engine has a front diaphragm to the cowling which prevents access to accessories mounted on the front even more effectively than a spinner backplate. It is doubtful whether it would ever be possible to remove this diaphragm without removing the airscrew even if a spoked backplate were used. A further disadvantage of this form of construction would be that it would render it extremely difficult to prevent a flow of air through the cut-outs in the spinner shell by the blades, back past the rear mounting, and out again at the junction of the spinner and cowling. The drag created by leaks such as this is becoming increasingly important as aircraft speeds rise, and we have in fact been doing a large amount of work on methods of sealing spinners to prevent such flow.

From spoked spinners the article passes on to a discussion on the use of a fan mounted on or incorporated in the spinner for cooling purposes, and suggests that a cooling spinner may be a more efficient means of cooling an air-cooled engine than a reverse flow because the inlet apertures for reverse flow may have to be so large. While this may perhaps be the case with some engines, it is only necessary to look at a front view of the Albatross, which is the only machine in actual service using reverse flow cooling, to see that the inlet apertures for this case at least are not such as to cause excessive drag. As is pointed out in the article, a fan, to be efficient, should be driven at a high speed, and it is noticeable that, even with the large-diameter fan shown in the photograph published with the article, the fan blades have had to be set at a fairly coarse angle, thus giving a relatively low efficiency.

In the concluding paragraphs, the bullet proofing of spinners was discussed and the oblique angle at which a bullet may strike a spinner and the rotation of the spinner are suggested as giving considerable assistance in deflecting a bullet. The peripheral speed of a spinner will usually be of the order of 200ft. per second which, compared with the speed of a bullet, is so small as to give an almost negligible effect. This is borne out by an examination of bullet holes in airscrew blades which near the tip may have a speed of 1,000ft. per second, but where a 0.303 bullet will still go right through about ½in. thickness of Dural at quite a small angle.

Nevertheless, the bullet-proofing of spinners is not an impossible proposition, and it is certainly to be hoped that the various investigations which Messrs. Marshall and Burton remark have been and are being made will yield satisfactory results.

THE DE HAVILLAND AIRCRAFT CO., LTD.,
K. B. GILLMORE,
Chief Designer, V.P. Airscrew Division.

[The spinner illustrated on page 468, December 5, was erroneously described as a bullet-proof. Actually, it showed a cooling spinner.—ED.]

Instruments by Air

THE Qantas-Empire Airways service went out of Brisbane recently carrying some delicate scientific gear for the Shell Company. These were highly sensitive gravitational-measuring instruments for oil search being conducted by the company in Australia.

The R.A.F. and the ARMY

New Command Instituted : Better Co-operation Planned

SOME authoritative explanations of what the Air Staff and the General Staff had in mind when the decision was taken to set up the new Army Co-operation Command of the R.A.F. are now available. The lessons of the campaign in the Low Countries and France have been studied, and the new Command is one of the results. Everybody was impressed by the very efficient co-operation of the Ju. 87 dive-bombers with the German ground troops, but the British staffs do not intend to be led into a mere copy of German methods. The Ju. 87 is a fairly ancient type of aircraft. It is no use for anything but dive-bombing, and it is inherently vulnerable. The Franco-British armies could not take advantage of its shortcomings because they could not obtain air superiority; they had not enough fighters. Certainly the British have no intention of making a slavish copy of the Ju. 87, but it is intended to provide the Army with suitable support from the air on lines somewhat similar to those on which the German dive-bombers were used. The squadrons using such machines would not be permanently allocated to the Army, as that would be considered wasteful. When the Army is in a condition of standing on the defence, as at present, there is no intention of keeping a number of bomber squadrons also inactive. The machines will have to be useful for other work for the R.A.F. Types of machine for this work are now in hand, and others of the same class may be bought from the United States. The U.S. Army Air Service has a section known as Attack, which specialises on dealing with ground troops and is equipped with suitable machines.

As for air-borne troops, whether parachutists or others, they were used effectively against the smaller neutrals, but in those cases the circumstances were very special. There were traitors in the countries and no anti-air defences. The menace to a country like Great Britain is not so serious. Such tactics depend on surprise, and the British are not going to be taken by surprise. Troop-carrying machines are very vulnerable when attacked by fighters. However, the question is being studied here in all its aspects.

The A.C. Squadrons

The so-called Army Co-operation squadrons, now equipped with the Lysander, have always been allocated to special Army Corps, or other formations, and work under their operational control. That arrangement will be continued under the new organisation. The work of these squadrons is mainly tactical reconnaissance on the front of the fighting troops and spotting for the artillery. The establishment of these squadrons provides that 50 per cent. of the officers, who are both pilots and observers, shall be Army officers seconded to the R.A.F. They are given temporary rank in the R.A.F. and their names appear in both the *Army List* and the *Air Force List*. In some cases the rank they hold in the R.A.F. is higher than their substantive rank in the Army. These officers now wear blue R.A.F. uniform. The airmen all belong to the R.A.F., and they prefer to take orders from an officer wearing the uniform to which they are accustomed. With each of these squadrons there lives an Army liaison officer. The officers of these squadrons are all familiar with the minor tactics of the Army, having gone through a course at the School of Army Co-operation.

It has been recognised that the Army needs more from the air than tactical reconnaissance. In the first place, it needs also strategical reconnaissance far behind the enemy's lines. This is best carried out by aircraft of the medium bomber class, and before the war some Blenheim squadrons were trained, some in this sort of reconnaissance by day, and others by night. The officers in them went through a course to prepare them for the work. Such squadrons would work under the staffs of the higher Army Commands.

Army Co-operation Lysander picks up a message in the desert.

There must be occasions, such as the Battle of France, when the whole strength of the Bomber Command will be required to throw its weight into a land battle to help the Army. There must sometimes be occasions, such as the evacuation from Dunkerque, when the whole Fighter Command will have to do likewise. Apart from such special occasions, the Army, when engaged in operations in the field, will constantly need bombers to attack certain targets, and all the aircraft working for the Army will need fighter protection. It has always been recognised by *Flight* that the Bomber Command must be flexible, ready to undertake the work which has become the most important at any one time. Bombers and fighters employed in that way will not need any special Army training. The Army staff will explain its requirements to the Air staff on the spot, and the latter will issue the necessary orders to the squadrons.

Objects of the New Command

It is largely to ensure that this arrangement works well that the Army Co-operation Command has been inaugurated. One of its Groups will care for training in Army requirements; the other Group will take charge of the Army Co-operation squadrons. On the staff of the Command and on the staffs of both Groups there will be Army officers. The object of the Command is to see that the Army is trained with the Air Force and the Air Force with the Army. It will be for the Army to make known its requirements and for the A.C. Command to do what is wanted. It is intended that both Army and Air Force shall work together with one strategy, not two strategies. In the case of the long-range bombers and the fighters, it will be the Air staffs which will receive Army training, not the squadrons. At every Army headquarters there will be an Air Force officer, and for the future Army officers will be expected to have an understanding of the possibilities and limitations of air action. In fact, a knowledge of air matters may in the future be a considerable help to an Army officer in being selected for important positions.

It has been officially stated that this arrangement satisfies the General Staff of the Army, and that its desire for a special Army air arm has been dropped. Whether or not it is the ideally best arrangement, it is certain, as was said above, that the Bomber Command must always be flexible. It will still appear to many that it would be better that the tactical reconnaissance squadrons should belong wholly to the Army, instead of having half their officers belonging to one Service and half to another. Nevertheless, it does appear that the new Army Co-operation Command will make better provision than has been made hitherto for providing the Army with necessary help from the air, and it is to be hoped and expected that its fruits will be seen when the Army again takes the field to strike the final blow in the present war.

GROUND ENGINEERS' EXAMINATIONS

Time to Look Ahead to Post-war Civil Aviation

By T. R. THOMAS,
Secretary, Air Registration Board

ALTHOUGH the great majority of those who were engaged in civil aviation before the outbreak of war are now concerned with more urgent matters, there are times when the problems which will have to be faced immediately after or even before the cessation of hostilities claim our attention.

Many men in the Royal Air Force at the present time are holders of Ground Engineers' licences and, almost without exception, they hope to have an opportunity of re-establishing themselves in civil aviation. No doubt they wonder what the status of the Ground Engineer will be after the war, when they will have to face the competition of men who are having their first introduction to aircraft engineering, and many of whom hope to make their present experience the basis of a career.

Everyone concerned looks forward to large developments in civil aviation, so that it may not only be an important factor in the nation's post-war development, but may help to provide employment for the people at present engaged in a huge industry concerned with the construction of Service aircraft and their equipment and maintenance.

The present system of licensing of Ground Engineers is based on the requirement of the Air Navigation Order that an aircraft plying for hire and reward should be certified daily by a competent person as airworthy and fit for flight, and of the Air Navigation Directions that repairs and overhauls should be properly certified.

Although many of the regulations governing the airworthiness of civil aircraft are the result of international agreement, and have been adopted by the countries which are signatories to the International Convention for Aerial Navigation, the Ground Engineer's licence is not of this character, and the system is not by any means universally adopted.

International Differences

Various countries issue certificates to engineers engaged on the construction or maintenance of aircraft but, except in the case of Great Britain and the Dominions, these have no legal status and vary in character and intent.

The Civil Aeronautics Authority of America, for instance, issue a mechanic's certificate enabling the holder to work on aircraft, which is really a guarantee to his employer of his knowledge and, to some extent, of his competence to carry out his duties. This certificate is of interest because it draws attention to the fundamental difference between a certificate of this character and the British Ground Engineer's licence.

The British licence is not, in its present form at least, a certificate which indicates that the holder is able to *do* certain things. It is merely an assurance that the holder knows when such things have been properly done—in other words, the Ground Engineer is primarily an inspector and, so far as his licence is concerned, need not be able to rectify a fault which he knows to be present. Both Ground Engineers and their employers should be clear on this point before they consider the present system and the possibilities of its improvement.

There may be a demand in the United Kingdom for a certificate of competence which would be some guarantee of a man's proficiency to do a job, but at the moment we are concerned only with the legal status of the Ground Engineer, and with a means of ensuring that the possession of a licence guarantees that the holder fulfils the requirements of the law and is a competent person within the meaning of the Air Navigation Act.

The present system was instituted soon after the last war. It is part of the airworthiness requirements which are based on the determination of the Government that, when a fare-paying passenger travels on a British aircraft, he shall have reasonable assurance that that aircraft is properly designed, constructed and maintained.

As the inspection of each particular type of aircraft and engine, and the construction of these, require specialised knowledge, it seemed the right policy then to issue a licence restricted to a particular type, and to define the limits of the responsibility of the Ground Engineer to either maintenance or construction. We have, therefore, categories "A" and "C" which entitle the holder to certify an aircraft and engine as fit for flight, and categories "B" and "D" which entitle the holder to certify structural repairs or major overhauls.

The British System

This system has worked reasonably well, and British Ground Engineers have a well-deserved reputation for efficiency and reliability. Such few failures to maintain a high standard as have occurred in the past have been due rather to the personal qualities of the holder of the licence—a matter which unfortunately is not assessible by means of a technical examination. Although the system has been satisfactory in the past, there were signs that it was not applicable in its entirety to the immediate pre-war conditions, and is likely to be less suitable to future conditions.

In the early days it was quite possible for the holder of an "A" licence to satisfy himself that a particular aircraft was fit for flight, but the increase in size and complexity of aircraft has made it impossible for him to do the same for a modern aircraft. The terms of the certificate which he signs after an inspection have been altered to meet these conditions, but, although now he is only required to take responsibility for the work of other men before certifying the aircraft, it still remains evident that the standard of knowledge required in the case of a two-seater aircraft is considerably less than that for a thirty-seater.

Just before the war it was possible for a man to have had experience of the maintenance of many different types of aircraft, and it was sometimes difficult to find room on his licence for the endorsement of all the types of aircraft or engines he was competent to certify. The result was that an "omnibus" licence was issued, entitling him to certify, for instance, all single-engined landplanes of British design and construction. This type of endorsement is not, however, very satisfactory because it takes no account of developments in aircraft construction of which the holder might not have had an opportunity to obtain experience. To except one aircraft from a licence of this kind is equivalent to going back to the system of endorsement of individual types.

Similar considerations apply to the "C" or engine maintenance licence, and there are parallel difficulties in respect of the constructional licences for both aircraft and engines.

Apart from these minor difficulties, any criticism which has been made in the past has generally been to the effect that the present standard of the syllabus and examination is rather too low.

Not a Certificate of Competence

A great many Ground Engineers seem to think that there is some justification for this criticism, but it must be remembered that in the case of the "A" licence for a simple aircraft it is not necessary that the man should be highly trained in order that he may be competent to give the required Certificate of Safety for Flight. He need only have had experience of maintaining the type under operating conditions.

The truth is that the tendency to regard a Ground Engineer's licence as a Certificate of Competence is increasing, and, as it is an excellent thing that every trade or profession should have a standard of knowledge to which

GROUND ENGINEERS' EXAMINATIONS (CONTINUED)

every member should try to attain, it would seem rational to devise a scheme by which the functions of the licence required by law and the Certificate of Competence, useful to both the holder and the employer, should be combined in the Ground Engineer's licence. To achieve this object it would be necessary to increase the scope of knowledge required for the licence, and to modify the nature of the examination on the result of which the licence is granted.

The present examination is a verbal one which takes on the average about an hour for "A" or "C" licences, and about two hours for "B" or "D" licences. It might be better to divide the examination into two portions—a written paper dealing with the more theoretical aspects of the syllabus and a verbal examination which would take care of the requirements of practical knowledge. Such a system would have the advantage of allowing a candidate who had attained the necessary theoretical knowledge by attendance at a training centre to take and pass the first part of the examination before he was fitted to take the second part because of his lack of practical experience.

It is true that some Ground Engineers would have difficulty in doing themselves justice at a written examination, but there is no reason why this examination should be either elaborate or difficult in the case of the simpler categories of licence. There is still less reason why a licensed Ground Engineer should not show himself capable of making a written report to his employer on the condition of an aircraft.

This arrangement might improve the procedure necessary to obtain a licence, but it would not help to solve the other difficulties which have been mentioned. To do this and to bring the Ground Engineer into line with the sea-going engineer, for instance, it would be necessary to revise the basis of the present system.

The difficulty of the multiplicity of aircraft and engine types could be surmounted by the issue of a licence which covered single-engined aircraft of less than a certain weight or engines of less than a certain horse-power.

Higher Standards Desirable

The syllabus for the examination for such a licence would necessarily be of a much more general character than is required at present when the licence is issued for a particular type. It is clear that the candidate would be required to have a sufficiently good engineering knowledge to enable him to deal with any engine, and a sufficiently good knowledge of the general principles of maintenance of aircraft to ensure that he could certify any small aircraft as fit for flight.

This would not be as formidable as it appears at first sight if a longer period of training than is at present called for was required, and if, in addition, the candidate had attained a reasonably high standard of engineering knowledge.

The responsibilities of a Ground Engineer are not less than those of a Marine Engineer, but the latter must have served four years' apprenticeship on the construction of marine engines and, in addition, must have a reasonable knowledge of arithmetic, mechanics and heat engines. Aircraft Ground Engineers might at first find it hard to comply with regulations as severe as these, but they would soon reach the standards required, and in a comparatively short time the enhanced value of the licence to the holder would make the trouble well worth while.

The next stage would be a licence enabling him to certify aircraft or engines of all types as fit for flight, and the theoretical knowledge required would be greater and experience of the maintenance of larger type aircraft would be required.

The constructional licences corresponding to the present "B" and "D" licences would probably have to be divided in a similar way between large and small aircraft and engines, but the requirements might be on similar lines. In this case a definite apprenticeship period or experience in the actual construction of aircraft or engines would surely be a necessity.

Up to this point the licences would be those required by law. The standard of knowledge required would be greater than at present, but this could hardly be regarded as a disadvantage.

Unfounded Fears

It is sometimes suggested that such a raising of the standard might produce a scarcity of Ground Engineers and so be hard on the club or small operator. It is not likely that this will be so in the period immediately after the war, when the difficulty will probably be to find employment for even well-qualified men.

Such licences would no doubt serve even more than at present as Certificates of Competence, but there seems no reason why the man who has obtained a complete set of them which would correspond to the present Ground Engineer who holds "A," "B," "C" and "D" should not be able to obtain a "super" licence which would cover aircraft and engines of all types. This qualification would require a high standard of theoretical and practical knowledge and, as such, would be of great value to the holder and to the operator of a fleet of aircraft.

Whether licences granted under the foregoing procedure would require renewal is a matter for consideration. At the date of issue they would guarantee to a prospective employer a certain standard of knowledge and experience in the holder. It should be the responsibility of the employer to satisfy himself that, after the date of issue, the holder had been employed in the aircraft industry in a capacity which would ensure that his knowledge was not less than when the licence was issued. It would perhaps facilitate matters if every Ground Engineer carried a "discharge" book in which his employer was required to enter his length and type of service. Such an entry would not be in the nature of a reference, but would merely state the facts.

The authorities concerned with the examinations for the issue of licences cannot serve the best interests of Ground Engineers unless they know how the Ground Engineer himself considers that they would best be served. It is therefore up to him to make his views known, and the Editor will no doubt be glad to offer his correspondence columns to any who would like to express their views on the foregoing proposals.

[Subject to space being available, we are prepared to open our Correspondence columns.—ED.]

Causes of U.S. Accidents

THOUGH there is nothing very conclusive in the report of the Civil Aeronautics Board regarding the accident on August 31, when a Douglas DC-3 belonging to Pennsylvania Central Airlines crashed near Lovettsville, Virginia, and killed 25 persons, it is thought probable that a severe lightning discharge may have caused loss of control.

The only other recent crash, which occurred on November 4 near Salt Lake City and killed ten persons, also involved a DC-3. This United Air Lines transport crashed in a snowstorm, and officials of the company think that the Salt Lake radio beam was to blame, for another of their craft at the same time signalled that only the "A" of the beam was being received and that the "N" could not be heard. (The "A" and "N" signals are the morse letters which indicate whether the aeroplane is on one side or the other of the beam.)

Brisbane Aerodrome

A TERMINAL building will be erected at the Archerfield Aerodrome, Brisbane by the Civil Aviation Department of Australia. Similar to those being erected at Adelaide and Sydney, the building will house all the department's staff, the air companies' offices, and will provide rest rooms, sleeping quarters for crews, a restaurant and an information bureau. The aerodrome control, meteorological, radio and flight checking officers will all have their offices within the building.

Air Strategy—XXXII

ITALY AS A TARGET—IV

Hitler's Attack Periods in Relation to the War with Italy

By
CAPTAIN NORMAN MACMILLAN, M.C., A.F.C.

For the purpose of air blockade, Capt. Macmillan divides Italy into three territories, Northern, Central and Southern. This week he deals with the Central.

THE war appears to have reached another of its distinctive phases. It is important to take stock of present conditions, for they are indicative of the future. The Italo-Greek branch of the war, now being fought on Albanian soil owing to the fighting qualities of the Greek soldiers and the apparently lax preparations of the Italian staff, is proceeding in a manner which can best be described as normal for warfare in the kind of country in which that war is at the moment being fought.

The *Luftwaffe* is pounding British cities by night, while Hitler and his staff of Nazi political experts propound a new agglomeration of "*Europapolitik*" among the States which Germany has overrun, or which her armies threaten. And I have little doubt that the *motif* of this design is the strengthening of the military power of Germany through every channel of supply open to the rapacious Nazi appetite for war materials.

Meantime it should be remembered that Hitler has in the past opened his campaigns in the spring of the year. It was in the spring that he remilitarised the Rhineland, the first definite step in the present war; in the spring he moved against Austria; in the spring he moved against Memel, Danzig and Czecho-Slovakia; in the spring he attacked Denmark, Norway, Holland and Belgium.

Spring and Autumn

Hitler's second-string attack period is the early autumn. In the autumn he pulled off the Munich conference and got the Sudetenland (which was to Czecho-Slovakia the equivalent of the remilitarisation of the Rhineland to France). In the autumn he attacked Poland. In both these cases he knew he was threatening territory wherein it was geographically impossible for anti-Hitler help to reach the victim in time.

Let us remember these things. They indicate that the invasion threat against the United Kingdom in the autumn of 1940 was a second-string threat.

If a real thrust against this country is to come, it is most likely to be made in the spring of 1941. The reports of embarkation and disembarkation practice by German troops in Norway is significant. There was similar practice on the German Baltic coast during the winter months of 1939-1940, and it continued for a long time before the attack was launched against Norway. These pointers must be remembered in relation to whatever action is taken against Italy, either in the Greco-Albanian or the Egyptian-Sudan theatres of war. Whatever Britain is prepared to do against Italy must be done between now and the spring of 1941, for at that date the probability is that we shall be faced with the major German offensive. (Hence the start of the British offensive in Libya.—Ed.)

Thus, in regarding Italy as a target, it must be borne in mind that Germany is the most powerful enemy, and the one which threatens our security.

Whatever action is taken against Italy ought to be regarded as action against the subsidiary target; it should not be allowed to drain too heavily from our ability to deal the most shattering blows which it lies within our power to inflict on German war economy.

Remember this, too. The winter months are passing. When the spring comes again it will bring with it shorter nights in the more northern latitudes in which we shall have to fight. Where we shall have to oppose Italy the summer nights are not so short. Night raids against Italy and Italian possessions can therefore be more facilely carried out throughout the year. Night raids against German territory and the German-occupied territories in the north of Europe cannot be so easily maintained in summer. Indeed, in Norway German troops occupy a zone of continuous daylight during the mid-summer months.

The Time to Strike

Night raiding against Germany ought to be at its maximum now. We were told when the autumn was setting in that the long winter nights would enable the Royal Air Force to attack targets much more distant in the Third Reich. But so far little has been reported of this activity. Why? Surely Germany is not being permitted to withdraw her industries into safe zones in the

ITALY AS A TARGET (CONTINUED)

territory east of Berlin? Or are we just waiting for her to get them nicely set up before we have a crack at them?

In Italy, too, we have been lenient in the south. Naples, Taranto, Brindisi, a couple of aerodromes in Sicily. That is not going to knock Italy out of the war.

The area which I defined as Central Italy from the aspect of air attack lies between the lines Genoa-Venice in the north and Ostia-Rome-Pescara in the south. Let us have a look at what lies within those two lines. First let us consider the aeronautical value of this area to Italy. Admittedly it is much less than that of the northern area, which is the true industrial heart of Italy, but it is, nevertheless, worthy of attention.

At Pisa there is the Piaggio concern; at Pontedera, on the road between Pisa and Florence, the Piaggio company makes aero engines. Also in the central area, at Final Ligure, the Piaggio company manufactures aircraft. At Pistoia (which lies in the Pisa-Florence area) is another company, San Giorgio S.A.I., which engages in the construction and repair of aeroplanes. Marina di Pisa is the site of CMASA, landplane and seaplane constructors.

In Florence there is a factory engaged in precision work in connection with aircraft production. There, too, is a company whose speciality is air photography. At Signa-Carmignano (Florence) there is a branch of Dinamite Nobel, manufacturers of explosives.

Not far from Florence, at Cengio-Cesano Moderno, there is another explosives factory. At Reggio Emilia, rather farther to the north, one firm specialises in petrol and oils, and ethyl alcohol, while another manufactures aero engines and parts for airframes. Slightly farther south, at Passignano, engine repairs are carried out and airframe work done in wood and metal. At Spezia there is a factory for precision work.

A Good Target Area

Thus within the comparatively small area bounded by lines drawn between Genoa-Reggio-Florence-Pisa and the coastline between Pisa and Genoa there is a considerable number of targets which are important because they have a direct bearing upon Italian military aviation. Each of the targets I have just mentioned is directly concerned with Italian military aviation. They all lie within an area whose sides measure approximately eighty miles from the nearest to the farthest points along the lines of flight from England to Italy, and whose transversal measurements vary from about 100 miles across at the northern end of the area to about 50 miles across at the southern end. The point of entry into this area lies only 70 miles beyond Milan, its farthest boundary lies only 160 miles beyond Milan. The maximum additional distance which British bombers would have to fly to attack the targets within this area compared with targets in Milan is thus about 320 miles, or less than two hours' cruising.

Surely the targets in this area ought to be attacked while still the long nights are with us? For aircraft attacking these targets from bases in England will require the cover of darkness to pass over the intervening territory with a reasonable degree of safety. The feature which demarcates this area, however, is that it forms the equidistant zone for air attack whether the attacking aircraft are based in England or in Greece. The distance which has to be flown to achieve entry into the area from British bases to the north-west is almost exactly identical with the distance which must be flown to achieve entry into the most southerly part of the area from bases available to British aircraft on the Greek mainland.

Thus, as far as it is possible to foresee, there are not likely to be opportunities more favourable for the launching of attacks against this not unimportant area of Italy until the war as a whole is drawing to an end victorious for Britain and her Allies. The time to attack these targets is now.

I believe it would have a most salutary effect to bomb targets in the neighbourhood of Florence, the city where Hitler last met Mussolini. Probably the residents of Florence believe themselves to be secure from the raiders of the night. Attack from the air would, therefore, come as a surprise. And surprises (even of the civil population) are useful in war. As there are at least three aviation targets in the area of Florence, the R.A.F. principle of bombing only military targets need not be violated.

Less Important

As one traces a finger southwards down the map of Italy the purely aeronautical targets diminish in number. But at Foligno, south-east of Perugia, there is a factory engaged on aircraft construction. As a target it could be best attacked by aircraft based in Greece.

In Rome there are (or were if Mussolini has had them transferred elsewhere to make of Rome an open city; but have they all been transferred?) a few targets which fall into the aviation category. Rome is the home of the Salvator parachute company who equip the *Regia Aeronautica*. At Segni there is a factory for the manufacture of bombs, powder, cartridges and explosives. At the Lido (Rome) there is an aircraft factory. And in Rome itself there is a company specialising in air photography, and another which makes small aero engines.

Near Pescara, at the other end of the line of demarcation of what I have called the Central Area of Italy for strategic consideration of air targets, there is another branch of Dinamite Nobel, explosive manufacturers. Predappio also falls within the Central Area of Italy. It is only a small place. But there is an aircraft concern here, called after the name of the place. Probably as a military target it is of small account. Certainly it cannot compare with Fiat, Caproni, Macchi and the rest of the big fellows in the Italian aircraft industry.

But there is a reason why it would be pleasant to give that place called Predappio a taste of the medicine which our enemies are so fond of administering to Albion. It is this: It was at Predappio, not far from the Republic of San Marino, that Benito Mussolini was born in 1883. Four targets which Mussolini would not like to have bombed are probably these:—

The Palazzo Venezia, which is his State Office; the Villa Torlonia, about two miles from the Palazzo Venezia, which is Mussolini's private house; Predappio, where he was born; and the Forum Mussolini, which is the Roman monument self-created by Mussolini to a modern Cæsar. And all these targets lie within the Central Area of Italy.

Probably our British rulers will claim that it would not be wise to bomb these targets, for they might imagine that it would make Mussolini an object of compassion for all his Italians. Would he gain their sympathy? I have already mentioned the Italian sense of humour. They like a joke at the Duce's expense. I think it might make them laugh. And that would be a grand contribution towards the winning of this war by the Allies.

(*Next Week: Southern Italy.*)

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

UNDER ARMS : A study of a Spitfire taking off at a Fleet Air Arm land station.

Middle East Appointments

AIR MARSHAL ARTHUR WILLIAM TEDDER has been appointed deputy to the Air Officer Commanding-in-Chief, R.A.F., Middle East, and has arrived in Cairo to take up his duties. This is the post that Air Marshal Boyd was on his way to take up when his machine made a forced landing in Sicily and he was taken prisoner.

Air Commodore Raymond Collishaw has been placed in command of the aircraft which are taking part in the Western Desert attack. Air Commodore Collishaw was a fighter pilot in the last war with 68 enemy machines to his credit. He served also in South Russia, Turkey and Egypt, and for a time was senior R.A.F. officer in H.M.S. Courageous. A few years ago he commanded the R.A.F. station at Heliopolis and last year he was appointed Air Officer Commanding the Egypt Group in the Middle East Command.

For Scots in London

THE Association of Scottish Societies in London have announced that they extend a cordial invitation to all serving Scotsmen who may be in London, whether on duty, on leave, or passing through, to visit "Caledonia," 2, Grosvenor Place, Hyde Park Corner, London, S.W.1. The house, with its furniture and equipment, has been kindly lent by His Grace the Duke of Buccleuch and the Association have opened it under the name "Caledonia," not as a club, hostel or canteen, but as a Scottish home in London where Scots personnel will be assured of a warm welcome by their own countryfolk. A team of London Scottish ladies will be in attendance daily from 9 a.m. to 9 p.m. to welcome and advise visitors, and the amenities available include the provision of hot meals at nominal prices; billiards, table tennis and other games; and an information bureau. It is also intended to hold concerts, cinema entertainments and dances from time to time.

Eagle Squadron Luncheon

CAPT. H. H. BALFOUR, M.C., M.P., Parliamentary Under Secretary of State for Air, spoke at a luncheon given to the Eagle Squadron of the R.A.F. at the Overseas Club. His opening remarks were:

"The Eagle Squadron of volunteer U.S.A. pilots symbolises the absolute determination, common to both the U.S.A. and the British Empire, to preserve our right to lead national and individual lives, free from domination by the crushing heel of Nazidom. We are grateful for your help. It is not praise you want, but opportunity.

"We look forward with certainty to the achievements and deeds of gallantry which the Eagle Squadron will perform, and we hope your squadron will be followed by the formation of other squadrons impelled by the same motives and imbued with the same ideals.

"You are in a peculiar position as members of the Royal Air Force, for opportunities do not end with your flying service. You can be ambassadors as well as airmen, for it is you who can spread throughout the United States a first-hand picture, by active combatants, of this country and all that we are doing and feeling."

After dealing with the various phases of the air war against Britain, and stressing our determination to see the thing through, he ended with:

"Please tell your fellow countrymen in the United States, which is giving such invaluable and increasing help to our cause, that there is no limit to what we can face and accept; tell them that we accept the dark passages of war as well as the successful, and that to-day we are more determined, and more certain of victory, than ever we have been in the past."

Recent Promotions

IN the *London Gazette* of Tuesday, December 10 it is announced that Air Vice-Marshal W. S. Douglas is promoted to the rank of Air Marshal (temporary). Air Vice-Marshal P. Babington is granted the acting rank of Air Marshal with effect from November 18, and is appointed Air Member for Personnel on the Air Council, vice Air Marshal E. L. Gossage.

In the General Duties Branch the following Group Captains are promoted to Air Commodores (temporary): A. W. Mylne; J. L. Vachell, M.C.; A. D. Pryor; W. H. Dunn, D.S.C.; H. H. MacL. Fraser; M. Thomas, D.F.C., A.F.C.; E. B. Mansell, O.B.E.; M. B. Frew, D.S.O., M.C., A.F.C.; H. G. Bowen, M.B.E.; and B. McEntegart.

In the Technical Branch Group Captain G. G. Dawson is promoted to the rank of Air Commodore (temporary) and is granted the acting rank of Air Vice-Marshal.

Awards

THE KING has been graciously pleased to approve the following awards, in recognition of gallantry displayed in flying operations against the enemy:—

DISTINGUISHED SERVICE ORDER.

P/O. E. S. LOCK, D.F.C., R.A.F.V.R., No. 41 SQN.—This officer has shown exceptional keenness and courage in his attacks against the enemy. In November, 1940, whilst engaged with his squadron in attacking a superior number of enemy forces, he destroyed two Messerschmitts 109, thus bringing his total to at least 22. His magnificent fighting spirit and personal example have been in the highest traditions of the service.

DISTINGUISHED FLYING CROSS.

ACT. SQN. LDR. D. S. MACDONALD—No. 213 SQN.—Since September, 1940, this officer has participated in 81 missions against the enemy. His excellent leadership and skill have contributed materially to the fighting efficiency of his squadron. He has destroyed at least three enemy aircraft.

F/O. P. J. SIMPSON—No. 111 SQN.—This officer has taken part in numerous engagements against the enemy over a long and intensive period of operations both in France and in England. He has shown exceptional keenness and skill, and has destroyed at least five hostile aircraft.

BAR TO THE DISTINGUISHED FLYING MEDAL.

SGT. A. MCDOWALL.—A.A.F., No. 602 SQN.—Sgt. McDowall has shown outstanding ability as a fighter pilot. He has destroyed at least fourteen enemy aircraft, and his leadership and courage have been of the highest order.

DISTINGUISHED FLYING MEDAL.

Sgt. H. J. MORSON, R.A.F. V.R., No. 115 SQN.; SGT. D. H. H. CLEVERLEY, No. 115 SQN.—In November, 1940, Sgt. Morson was the captain and Sgt. Cleverley the wireless operator of an aircraft which successfully attacked a target in the vicinity of Berlin. On the return journey intense anti-aircraft fire was encountered over Hamburg, which caused damage to the aircraft and set the starboard engine on fire. In spite of this, Sgt. Morson set a direct course for base, which necessitated flying across the Heligoland Bight, and, although many difficulties were overcome, he was unable to maintain height and was finally forced down into the sea.

With great skill and devotion to duty Sgt. Cleverley maintained full wireless communication, keeping his base constantly informed of the position. He was undoubtedly responsible for the successful rescue action which was subsequently taken. Sgt. Morson has completed thirteen and Sgt. Cleverley twenty-three successful operational flights, and both have displayed great skill, courage and determination.

SGT. G. A. STEWARD, No. 17 SQN.—This airman has been continuously engaged in operation since May, 1940. He has shown excellent ability as a section leader over a long period of intensive air operations, both in France and in England. Sgt. Steward has destroyed at least four enemy aircraft and shared in the destruction of others. He has displayed great tenacity throughout.

Roll of Honour

Air Ministry Casualty Communique No. 54.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed.

KILLED IN ACTION (WHILE FLYING IN OPERATIONS AGAINST THE ENEMY).—P/O. D. M. Agnew, 334864; Sgt. D. K. Ashton, 741212; Sgt. H. Brookes, 745413; Sgt. E. F. Edwin, 742166; Sgt. S. F. Elliott, 935731; Sgt. E. C. Gardiner, 562691, Sgt. J. E. Gethin, 940885; L.A/C. D. F. Giles,

Air-Commodore J. H. D'Albiac, D.S.O., A.O.C. British Forces in Greece, has received promotion to Acting Air Vice-Marshal.

SERVICE AVIATION (CONTINUED)

622754; Sgt. S. Goldberg, 746710; P/O. G. H. Hackwood, 42217; A/C.1 B. F. Hare, 648104; Sgt. F. L. Ingersent, 553881; Sgt. R. S. C. Ivatt, 741530; Sgt. N. H. Jackson, 749426; Flt. Lt. R. W. Jones, 70351; P/O. A. R. Kerr, 79182; P/O. W. G. M. Lambie, 42235; Sgt. J. Merifield, 751514; Flt. Lt. A. Moncrieff, 32109; Sgt. J. L. F. Ottoway, 528798; Sgt. E. E. Owen, 551167; Sgt. W. C. I. Parker, 904426; Sgt. D. J. Pearcy, 903249; Sgt. R. Pelham, 741416; Sgt. D. Pewsey, 970469; Sgt. R. E. Plant, 748027; Sgt. C. Richardson, 529564; Sgt. A. L. Romanis, 751715; F/O. A. J. Storrie, 43641; Sgt. A. J. Theasby, 1161473; P/O. K. W. Worsdell, 33497.

PREVIOUSLY REPORTED "MISSING, BELIEVED KILLED IN ACTION," NOW PRESUMED "KILLED IN ACTION."—Sgt. W. J. Anning, 525720; L.A/C. D. Armstrong, 543847; P/O. R. A. Gayford, 40295; P/O. T. Hurst, 33388; Sgt. R. J. Moore, 522730; Sgt. C. A. Morgan, 523510; A/C.1 J. Moss, 629737; Sgt. M. F. Murphy, 580755; Sgt. W. F. Nicol, 740335; L.A/C. C. R. Wells, 551357.

PREVIOUSLY REPORTED "MISSING," NOW PRESUMED "KILLED IN ACTION."—P/O. J. B. Bull, 40599; F/O. J. A. Campbell, D.F.C., 39492; A/C.2 W. H. U. Dolley, 648552; P/O. T. J. Edwards, 70200; Act. Cpl. G. Fawcett, 623895; A/C.1 L. J. Fowell, 622095; L.A/C. H. T. Garbett, 533153; Act. Flt. Lt. R. P. A. Harrison, 37599; Sgt. T. C. R. Harrison, 580203; A/C.2 H. Harrott, 618068; Sgt. W. T. Howells, 562745; A/C.1 C. A. Hughes, 333908; Sgt. N. S. D. Jones, 580417; L.A/C. D. S. Lloyd, 547593; L.A/C. T. J. Lowry, 553205; A/C.2 E. Mold, 626134; P/O. A. D. Pilcher, 40848; Sgt. W. Priestley, 564931; L.A/C. A. F. Roberts, 522093; L.A/C. R. A. Roberts, 540263; Sgt. J. C. Robertson, 749443; A/C.1 W. S. Rodulson, 551863; L.A/C. R. Sloan, 517038; P/O. W. A. L. Smith, 40950; P/O. P. W. Vaughan, 35495; P/O. Sir A. T. Wilson, K.C.I.E., C.S.I., C.M.G., D.S.O., M.P., 75684.

PREVIOUSLY REPORTED "MISSING, BELIEVED KILLED IN ACTION," NOW REPORTED "KILLED IN ACTION."—A/C.2 A. Jackson, 1050666; P/O. R. F. G. Miller, 42419.

PREVIOUSLY REPORTED "MISSING," NOW REPORTED "KILLED IN ACTION."—F/O. G. C. B. Peters, 40593; Sgt. A. Russell, 533654.

WOUNDED OR INJURED IN ACTION.—Sgt. A. T. R. Aslett, 755648; F/O. L. T. Benson, 40876; Sgt. A. D. Burt, 566159; P/O. A. J. Cuthbert, 80806; P/O. W. L. Ellingham, 74701; Sgt. H. E. Geen, 744982; Flt. Lt. W. B. Goddard, 36126; Sgt. S. Hird, 749465; Sgt. D. E. Kingaby, 745707; P/O. E. S. Lock, D.F.C., 81642; Sgt. A. H. Norman, 565120; Sgt. S. C. Phillips, 610375.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. A. Buckley, 744989; Sgt. P. D. Goldsmith, 745580; Sgt. F. H. Jervis, 936651; Sgt. E. Mill, 740701; P/O. K. L. Millar, 74682; Sgt. H. A. C. Roden, 740410; P/O. F. A. Toombs, 79221, Sgt. P. C. Wise, 741551.

PREVIOUSLY REPORTED "WOUNDED OR INJURED IN ACTION," NOW REPORTED "DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION."—P/O. H. H. Chalder, 43691; Sgt. C. S. C. Green, 747715.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. R. E. Andrews, 641627; P/O. P. Arnold, 78736; Sgt. G. N. Brooks, 742451; Sgt. R. Bucknell, 742529; F/O. J. A. Champness, 70124; Sgt. E. B. Childs, 566516; Sgt. S. Dale, 651852; P/O. B. A. Z. De Bressey, 79235; Sgt. D. D. English, 742163; Sgt. G. R. Fryer, 759334; Sgt. C. D. Gavin, 580393; Sgt. J. D. Green, 551605; Sgt. R. B. Guest, 905255; Sgt. T. Hanlon, 755457; Sgt. H. S. Haste, 550065; Sgt. T. W. Hawxby, 638754; Sgt. C. Hay, 965765; A/C.1 J. Higgins, 638025; Sgt. J. H. Keddie, 645315; Sgt. C. W. Laughton, 538373; Sgt. A. B. Lindsay, 751189; Sgt. R. B. Lister, 754795; Sgt. P. H. McLoughlin, 581290; Sgt. J. G. W. Maybury, 580719; P/O. E. W. J. Monk, 44403; Sgt. J. C. Morgan, 741943; P/O. D. Murray, 41050; F/O. R. D. Perkins, 41201; Sgt. D. Philip, 751894; Sgt. E. R. Pitts, 581243; Sgt. J. H. Potter, 747830; Sgt. E. Powell, 5548940; Sgt. T. Robson, 939777; Sgt. H. Sharpley, 742808; Sgt. W. S. Smith, 905353; Sgt. J. G. Stewart, 566189; Sgt. C. Stockman, 906289; Cpl. D. Stott, 526089; Sgt. E. Taylor, 651358; Sgt. J. C. Threlfall, 746949.

MISSING.—Sgt. T. E. Ashurst, 751950; P/O. G. D. Bailey, 44463; P/O. P. A. Baillon, 86331; Sgt. L. Ball, 745177; Sgt. J. R. Barnes, 751591; Sgt. R. C. Bishop, 653306; Sgt. H. W. Brook, 581316; Sgt. J. G. G. Butler, 938208; P/O. C. D. Chapman, 43280; Sgt. S. C. Chester, 742972; L.A/C. W. J. S. Chick, 538738; Sgt. F. A. Cope, 741719; Sgt. R. Cox, 580645; Sgt. E. A. Dean, 754574; Act. Flt. Lt. J. C. Dundas, D.F.C., 90334; Sgt. T. D. Elliott, 966874; P/O. P. T Empson, 42986; Wing Cdr. K. F. Ferguson, 32099; Sgt. W. Fraser, 747914; Sgt. A. J. W. Friend, 812272; Sgt. B. T. M. Fulton, 741624; Sgt. W. J. Gilmour, 734017; Sgt. T. W. Glenn, 742263; Sgt. T. W. Gostick, 903566; Sgt. J. Gray, 641045; Sgt. B. W. Green, 748754; Act. Wing Cdr. S. R. Groom, 26032; Sgt. J. G. Hair, 970690; P/O. G. Henocq, 82688; Sgt. B. Henson, 742563; P/O. B. H. Herrick, 42003; A/C.2 G. G. S. Hills, 631209; Sgt. C. P. Hoare, 751805; Sgt. L. Hogarth, 524701; Sgt. N. W. Hull, 638879; Sgt. A. Hyam, 749403; P/O. J. G. Langford, 42848; Sgt. D. E. Larkman, 742991; Sgt. A. B. Lattimer, 755367; Flt. Sgt. E. H. Lord, 365751; Sgt. V. H. Louis, 971490; Sgt. T. H. Mellon, 755040; Sgt. F. L. Moore, 748765; Sgt. M. B. Mott, 937153; Sgt. J. L. Moyes, 643193; Act. Flt. Lt. A. F. Mudie, 40558; Sgt. A. W. Newton, 536600; Sgt. A. W. Norman, 904840; Sgt. F. A. Parton, 748208; P/O. E. R. M. Pears, 84012; Sgt. R. Rodger, 632049; Sgt. C. S. Rogers, 741897; Sgt. G. A. Ross, 754735; Sgt. C. E. Russell, 968588; F/O. A. M. L. Selby, 40264; Sgt. W. F. Sidaway, 565797; Sgt. R. Sinclair, 755604; Sgt. P. R. Smith, 581477; Sgt. J. C. Steel, 742995; Sgt. D. G. B. Steell, 759143; Act. F/O. E. D. Stevens, 74568; Sgt. V. G. Sullivan, 969335; A/C.2 A. E. Taylor, 906563; Sgt. R. W. Toomey, 550284; Sgt. J. C. Walton, 748446; Sgt. J. M. Ward, 742466; Sgt. A. Watson, 551877; F/O. S. A. Waugh, 41504; Sgt. K. F. Weston, 903273; Sgt. C. Whitfield, 525569; Sgt. J. G. D. Wilson, 755595.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE (WHILE ENGAGED ON NON-OPERATIONAL FLYING DUTIES OR ON THE GROUND THROUGH ENEMY ACTION).—A/C.2 H. K. Lockett, 627785; A/C.1 W. M. Parry, 985584; A/C.2 H. S. Wheelhouse, 1050222.

KILLED ON ACTIVE SERVICE.—F/O. M. L. Arnold, 78290; Sgt. R. B. Barr, 741009; P/O. J. W. F. Bartholomew, 78886; A/C.1 J. J. H. Bell, 629670; A/C.2 M. Bernstein, 156202; L.A/C. D. W. Biggs, 915936; L.A/C. W. R. Blackburn, 539168; Sgt. F. H. Bonfield, 581430; Sgt. S. Bradley, 749429; A/C.2 F. Broadhurst, 1154792; Cpl. R. J. Burton, 355278; Sgt. C. E. P. Castle, 966825; Sgt. P. A. Chamier, 900818; A/C.2 P. S. Cotter, 1056210; L.A/C. C. E. Crocker, 812067; A/C.2 T. Davidson, 1056187; A/C.2 W. E. R. Few, 1157195; P/O. F. P. Fry, 44409; A/C.2 S. F. Gartaway, 1164531, Cpl. F. G. Giles, 617858; P/O. R. O. Givan, 84995; P/O. C. E. Goldsmith, 43135; Sgt. J. A. Hartop, 745668; L.A/C. K. Hems, 633521; Cpl. E. G. Howells, 567595; A/C.2 H. W. Humphreys, 1309401; A/C.1 H. A. Hyner, 297123; P/O. W. A. P. Jones, 43100; A/C.1 F. S. Kilby, 701026; P/O. J. A. P. McClintock, 91064; Sgt. G. McGeoch, 644316; Sgt. J. E. Murphy, 631909; L.A/C. L. Nicholson, 844631; A/C.1 F. C. Reeves, 844716; L.A/C. J. R. M. Sands, 844529; F/O. L. M. Sanderson, 90014; F/O. H. A. Skeats, 72003; A/C.2 W. Sole, 956126; P/O. J. E. Stansbury, 43129; L.A/C. N. D. Steele, 923659; L.A/C. M. J. W. Taylor, 915786; A/C.2 B. A. Tisdale, 1181653; P/O. A. J. J. Truran, 91019; A/C.2 F. Walker, 1006638; Act. Cpl. H. C. H. Webber, 916068; L.A/C. A. O. Wontner-Smith, 1250761; A/C.2 E. S. Yates, 1160752.

PREVIOUSLY REPORTED "MISSING," BELIEVED KILLED ON ACTIVE SERVICE," NOW PRESUMED "KILLED ON ACTIVE SERVICE."—A/C.2 V. Bishop, 530720; P/O. J. D. Williams, 40585.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. T. Forbes, 566499; Sgt. P. H. Fox, 754399; A/C.2 W. Hodgson, 1354827; A/C.2 W. A. Howes, 1185271. L.A/C. H. G. Jenkins, 552105; A/C.2 S. J. Lambie, 1125906; A/C1 A. Moore, 849846; P/O. R. F. Philo, 42433; A/C.2 H. G. Price, 919647; L.A/C. A. N. Prior, 906093; Sgt. R. H. Stockwell, 746850; L.A/C. W. I. West, 613891.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—A/C.1 J. Bain, 996328; Sgt. L. E. C. Blake, 581080; Sgt. P. L. Brace, 745496; Sgt. J. H. Moss, 905501; A/C.2 B. C. Northway, 1250211; A/C.2 T. Roberts, 852043; A/C.2 H. E. Stennett, 747227.

DIED ON ACTIVE SERVICE.—A/C.2 K. F. Airey, 944787; A/C.1 J. C. Alcock, 953906; A/C.1 R. W. Bishop, 574038; Cpl. F. J. H. Clarkson, 568393; Sgt. G. A. Coleman, 742031; A/C.1 A. Cousins, 653086; Sgt T. Crehan, 364593; A/C.2 W. Currill, 1201815; L.A/C. V. E. Dawes, 542749; A/C.1 R. H. Driver, 906313; Sgt. W. Duncan, 623462; Act. Sqn. Ldr. P. de C. Festing-Smith, 16194; A/C.2 S. F. Finch, 1004463; A/C.2 W. Fraser, 1355470; Cpl. R. C. C. French, 845038; L.A/C. R. H. Gordon, 943151; P/O. J. L. Harms, 77216; Flt. Sgt. G. F. J. James, 362458; L.A/C. J. E. Jones, 541047; A/C.1 R. W. King, 925805; Sgt. A. V. Kirkbride, 98380; Sgt. B. W. Lambie, 517842; L.A/C. J. G. McDowell, 702239; Sqn. Ldr. G. J. Maygothling, 10125; L.A/C. S. C. Norris, 161555; A/C.2 R. S. Pittock, 1280438; Cpl. T. Potts, 522142; A/C.2 R. Rennie, 1307761; A/C.2 B. T. Sanders, 1004159; Sgt. E. A. Sims, 591057; A/C.2 J. H. Smalley, 1250416; F/O. E. J. Travers, 83697; A/C.2 C. S. Tulk, 1258546; Sgt. W. J. J. Westbrook, 515582.

PREVIOUSLY REPORTED "KILLED IN ACTION," NOW REPORTED "PRISONER OF WAR."—P/O. A. G. Sheppard, 78447.

PREVIOUSLY REPORTED "MISSING," NOW REPORTED "PRISONER OF WAR."—Sgt. E. H. B. Cotton, 627819; F/O. E. R. Cuff, 43867; Sgt. D. G. Hamilton, 647582; A/C.2 G. W. Rook, 645027; Flt. Lt. A. A. Rumsey, 22246; L.A/C. R. J. Utteridge, D.F.M., 536916; A/C.2 E. J. Williams, 640242.

SOUTH AFRICAN AIR FORCE.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Major S. Van-Stuz, 102612.

KILLED ON ACTIVE SERVICE.—Lieut. W. H. Morris, 202944.

BAKER'S DOZEN: Flt. Sgt. G. C. Unwin, D.F.C., who has been awarded a Bar to his decoration for keenness, courage and determination. He has a total of thirteen victories to his credit.

Prisoners of War

NEXT of kin, if able to identify the men from the information published, are requested to advise the Casualty Branches of the Services concerned, forwarding regimental or other details.

The following is the latest list of British prisoners of war as received from enemy sources:—

P/O. R. E. H. George, Victoria Road, Gorleston, Norfolk.

Sgt. E. A. Brown, Pembroke Street, London.

Sgt. J. A. Popper, Park Road, Wallasey, Cheshire.

Sgt. A. Hamilton, Beriners Road, Glasgow.

Sgt. J. Daniels, Great Lister Street, Birmingham.

Sgt. J. Wilkinson, Clyde Terrace, Spennymore, Durham.

Sgt S. Corkwell, Kathleen Road, Stoneferry, Hull.

P/O. R. E. Troward, Somerville Place, Merthyr Tydfil, or 52, Home Park Road, Wimbledon Terrace, London.

Sgt. J. V. W. Stedman, Treetops, Sunnywood Drive, Haywards Heath.

London Gazette

Royal Air Force

General Duties Branch

The undermentioned Flight Lieutenants (temporary Squadron Leaders) are granted permanent commissions in the substantive rank of Flight Lieutenant:—(March 16) R. C. Crawford; (Sept. 14) B. Samson.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—Flight Sergeants: (Oct. 26, Sen. Oct. 16) E. E. Fitchew; (Nov. 5, Sen. Oct. 30) D. T. Witt; (Nov. 14, Sen. Nov. 6) C. Midwinter; (Nov. 15, Sen. Nov. 6) E. J. Fleet; (Nov. 16, Sen. Nov. 6) A. E. Feather. Sergeants: (Aug. 13, Sen. Aug. 9) R. J. Jones; (Aug. 20, Sen. Aug. 9) J. P. Balfour; (Aug. 24, Sen. Aug. 7) R. S. Gunning, D.F.M.; (Sept. 7, Sen. Aug. 28) G. B. Blacklock; (Oct. 15, Sen. Oct. 9) A. M. Crouch; (Oct. 26, Sen. Oct. 16) A. D. Bentley; (Nov. 1, Sen. Oct. 16) E. R. Abbott; (Nov. 2, Sen. Oct. 9) A. E. Forgeard; (Nov. 6, Sen. Oct. 30) C. N. S. Campbell, R. C. G. Harman, H. G. Jones, L. H. Styles; (Nov. 7, Sen. Oct. 30) W. E. G. West.

The undermentioned Pilot Officers on probation are confirmed in their appointments:—(Oct. 1) C. Warren; (Oct. 8) T. R. Burne; (Oct. 9) E. M. C. Guest, J. C. Lowe, T. P. Seymour; (Oct. 23) H. H. Holland, A. R. Wright, D.F.C., R. D. Yule.

The undermentioned Pilot Officers on probation are confirmed in their appointments and promoted to the rank of Flying Officer:—(Sept. 28, Sen. Sept. 27) G. Ashfield; (Oct. 1) J. D. Steuart-Richardson; (Oct. 8) J. C. Alexander, R. J. S. Parsons; (Oct. 9) M. C. Raban; (Nov. 26, Sen. Sept. 27) J. Mitchell.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant:—(Sept. 3) J. T. Gibson (ret.), M. H. Cox, C. H. Boxall; (Sept. 13, Sen. Sept. 13, 1939) A. D. Bryant (Capt., R. Northumberland Fusiliers); P. Legge (Capt., R.A.); (Sept. 22, Sen. Sept. 22, 1939) W. D. Blackwood, D.F.C. (Lt., R. Tank Corps); (Oct. 1) J. A. F. Maclachlan, D.F.C., G. L. Sinclair; D.F.C., J. L. Riley, P. R. O'Connor;

SERVICE AVIATION (CONTINUED)

(Oct. 4) G. Wilson (ret.), A. T. Staveley; (Oct. 5) M. K. Carswell; (Oct. 6) J. R. Barnley; (Oct. 9) A. M. Campbell; (Oct. 15) K. H. Blair, D.F.C., H. N. Burrows, W. D. L. Filson-Young; (Oct. 26) J. W. Villa, D.F.C.; (Nov. 1) F. Austin; (Nov. 24) J. H. G. Walker; (Nov. 30) J. F. Sharp.

The undermentioned Pilot Officers are promoted to the rank of Flying Officer:—(March 6) J. R. Whelan, D.F.C.; (April 7, Sen. Jan. 7) P. H. Baldwin, K. D. Bruce, G. L. Cheshire, B. A. Rogers, A. C. L. Akroyd-Stuart, R. W. Whittome; (April 21, Sen. July 21, 1939) P. J. Carpenter, R. W. H. Stevenson, R. Gray (72081) (substituted for notifications of Nov. 19, p. 6633, col. 1, and p. 6637, col. 2, concerning this officer); (June 5) D. G. Heaton-Nicholls; (Sept. 3) D. R. Turley-George, C. M. B. Symons; (Sept. 23) L. W. Stevens, V. G. W. Engstrom; (Sept. 30) L. M. O'Leary; (Oct. 2) L. E. Cryderman, W. H. Arnold, L. C. Kingsbury, J. A. Dixon; (Oct. 3) A. S. Linney; (Oct. 23) W. Armstrong; (Nov. 6) R. M. Trousdale, R. H. Wiens, W. L. McKnight, D.F.C., M. B. Mallett, F. G. Axtell, R. W. Stokes, M. H. Young, D. H. S. Kay, D.F.C., S. R. Thomas; (Nov. 18) T. D. Saul.

The undermentioned Squadron Leaders are transferred to the Technical Branch (April 24):—R. R. Fairweather, F. W. Foster, D.F.C., D.S.M.

P/O. L. F. Humphrey is seconded for special duty (July 1).

F/O G. H. F. Plinston takes rank and precedence as if his appointment as Flying Officer bore date Oct. 26, 1938. Reduction to take effect from Oct. 8.

Group Capt. E. D. M. Robertson, C.B., D.F.C. (Ret.), reverts to the retired list and resumes his former rank of Air Commodore in which rank he is recalled to the active list (Nov. 21).

The undermentioned Pilot Officers relinquish their temporary commissions on return to Army duty:—(Oct. 25) R. B. O'H. Warburton, 2nd Lt., R.E. (T.A.); (Nov. 2) M. L. Marsh, 2nd Lt., R. Warwick R. (T.A.).

The undermentioned relinquish their short service commissions on account of ill-health:—Flying Officer: (Nov. 26) J. A. H. Beckton. Pilot Officer: (Dec. 3) J. F. Howitt.

Erratum.

Notification of July 16 (p. 4366, col. 2) concerning Flt. Sgt. G. P. Hall should have appeared under the heading "R.A.F." and not "R.A.F.V.R."

Technical Branch.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers on probation:—Warrant Officers: (Nov. 1, Sen. Oct. 22) W. A. Dawe; (Nov. 5, Sen. Oct. 25) E. H. Sillince; (Nov. 7, Sen. Oct. 23) W. Bentall; (Nov. 11, Sen. Oct. 29) V. I. C. A. Ball; (Nov. 11, Sen. Oct. 30) H. W. Cooper; (Nov. 13, Sen. Oct. 31) G. W. Dodds. Pilot Officers on probation:—Warrant Officers: (Nov. 1, Sen. Oct. 23) D. McDermott; (Nov. 5, Sen. Oct. 21) L. Welch; (Nov 5, Sen. Oct. 24) A. W. Darnell; (Nov. 7, Sen. Oct. 28) L. Morgan; (Nov. 11, Sen. Oct. 29) R. Darker; (Nov. 11, Sen. Oct. 31) E. Roberts; (Nov 12, Sen. Oct. 24) W. L. Weager, F. P. Gardiner Flight Sergeants: (Nov. 1, Sen. Oct. 23) G. E. Walker; (Nov. 6, Sen. Oct. 21) C. H. R. McNally; (Nov. 6, Sen. Oct. 22) L. E. King; (Nov. 11, Sen. Oct. 22) E. D. Bath; (Nov. 13, Sen. Oct. 23) P. A. Heppell

The undermentioned Flying Officers are confirmed in their appointments:—(Oct. 15.) A. T. Jones, M.M., H. L. Whitlock; (Oct. 30) G. O. Thomson.

Administrative and Special Duties Branch.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers on probation:—Warrant Officers: (Oct. 28, Sen. Oct. 15) A. F. Germain; (Nov. 6, Sen. Oct. 21) W. D. Coleman, M.B.E.; (Nov. 11, Sen. Oct. 23) J. K. McK. Semple. Pilot Officers on probation:—Warrant Officers: (Oct. 28, Sen. Oct. 10) F. W. H. Ainsworth; (Oct. 28, Sen. Oct. 11) M. P. Croft; (Oct. 28, Sen. Oct. 7) F. E. Dudley; (Oct. 28, Sen. Oct. 8) F. H. Pratt, F. J. Rowe; (Oct. 28, Sen. Oct. 9) W. Lawry, A.F.M.; (Nov. 6, Sen. Oct. 21) F. S. Turner; (Nov. 14, Sen. Oct. 29) T. H. Elliott. Flight Sergeants: (Oct. 22, Sen. Oct. 1) J. B. Hay; (Oct. 23, Sen. Oct. 4) J. Colquhoun; (Oct. 25, Sen. Oct. 4) L. G. Chapman. Sergeants:—(Nov. 6, Sen. Oct. 21) C. W. Martin; (Nov. 11, Sen. Oct. 24) R. C. Spicer. Corporal:—(Oct. 14, Sen. Aug. 30) F. S. Alexander. Leading Aircraftman:—(Oct. 30, Sen. Oct. 14) C. M. V. Hamilton.

Equipment Branch.

F/O. on probation G. H. C. Baker is confirmed in his appointment (Oct. 20).

P/O. on probation J. T. Cramb is promoted to the rank of Flying Officer on probation (Sept. 15).

The undermentioned Pilot Officers on probation are confirmed in their appointment (Aug. 17) and promoted to the rank of Flying Officer:—(Oct. 14) R. J. Tilley, (Oct. 15) R. O. Snape; (Oct. 25) P. J. Finn; (Oct. 31) C. S. Hatfield.

Accountant Branch.

Cpl. P. C. Dainty is granted a commission for the duration of hostilities as Acting Pilot Officer on probation (Nov. 1, Sen. Oct. 10).

The short service commission of P/O. on probation W. Buckley is terminated on cessation of duty (Nov. 24).

P/O. on probation A. Moorcroft is confirmed in his appointment (July 29), and promoted to the rank of Flying Officer (Sept. 7).

Erratum.

In notification of Sept. 13 (p. 5491, col. 2) concerning Sgt. W. R. E. Wilson. *For* Aug. 24 *read* Aug. 26.

Medical Branch.

Flt. Lt. R. S. Peill, M.B., Ch.B., is granted a permanent commission in the substantive rank of Flight Lieutenant (Sept. 2).

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS.

General Duties Branch.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant:—(Sept. 3, 1939) G. F. Hales; (Sept. 3) C. E. F. Riley; (Sept. 8) E. C. Jackman; (Sept. 14) W. S. Coates; (Sept. 25) W. R. Bailey; (Nov. 6) R. M. Pimm; (Nov. 15) D. W. Law; (Nov. 25) R. B. Crow; (Nov. 30) H. Swanston, A. S. Gilbert.

The undermentioned relinquish their commissions in class CC on appointment to commissions in the Royal Air Force Volunteer Reserve:—(Sept. 11, 1939) Flt. Lt. R. S. Barbour; (June 18) Sqn. Ldr. H. V. Smith.

P/O. E. R. Bowman resigns his commission (Nov. 15).

The notifications of April 30 and May 7 concerning R. S. Barbour are cancelled.

BALACLAVA BACKWARDS: Flt. Lt. J. C. Mungo-Park, D.F.C. (in cockpit) and P/O H. M. Stephens, D.F.C. and Bar, who, between them scored the six hundredth victory for their Fighter Station.

The notification of Aug 27 (p. 5222, col. 2) concerning F/O. F. W. Moss is cancelled.

Erratum.

In notification of Aug. 4 (p. 5837, col. 1) concerning P/O. on probation R. W. Edward. *For* Sept. 28 *read* Nov. 30.

Equipment Branch.

P/O. on probation J. Bayliss is confirmed in his appointment (July 7) and promoted to the rank of Flying Officer (Oct. 30).

Erratum.

In notification of Oct. 22 (p. 6142, col. 2) concerning F/O. D. A. Watson. *For* Flying Officer *read* Flight Lieutenant.

Royal Air Force Volunteer Reserve

General Duties Branch.

The undermentioned are granted commissions for the duration of hostilities as Flying Officer:—(Nov. 12) C. J. McN. Bowie. As Pilot Officers on probation:—(Nov. 14) W. G. T. Brown. Sergeants: (Aug. 25) G. N. Bales, J. R. C. Bennet; (Sept. 29, Sen. Sept. 18) R. A. C. Holme; (Oct. 2, Sen. Sept. 29) M. J. Smith; (Oct. 10, Sen. Oct. 9) T. Birkett; (Oct. 19) C. C. Cheshire, J. S. B. Tyrie; (Oct. 24, Sen. Oct. 25) E. A. Hood; (Oct. 31, Sen. Oct. 23) W. C. Carswell; (Nov. 4, Sen. Oct. 30) R. P. Stevens; (Nov. 6, Sen. Oct. 30) L. S. Pilkington, D.F.M.; (Nov. 7, Sen. Oct. 30) L. C. Arthur; (Nov. 8, Sen. Oct. 23) A. J. W. Males; (Nov. 9, Sen. Oct. 29) H. T. Jones; (Nov. 11, Sen. Nov. 3) P. J. A. Thompson; (Nov. 16, Sen. Aug. 9) M. R. Aries; (Nov. 16, Sen. Oct. 27) J. E. Smith, A. Sumner; (Nov. 16, Sen. Nov. 2) H. G. Craigmile; (Nov. 16, Sen. Nov. 7) M. Littlewood. Leading Aircraftmen: (Nov. 3) E. R. Benson, A. F. Struthers, G. T. Thain, R. Vevers, J. H. Waite; (Nov. 4, Sen. Oct. 27) M. F. Andrews; (Nov. 9, Sen. Oct. 29) H. A. Williams; (Nov. 9, Sen. Nov. 3) P. Jack; (Nov. 16, Sen. Oct. 27) J. A. F. Sowrey; (Nov. 16, Sen. Nov. 2) A. B. Broadley, J. F. Slatter; (Nov. 16, Sen. Nov. 3) E. H. Atkins, L. G. Bedford, C. A. Blackburn; (Nov. 16, Sen. Nov. 7) T. Maxwell-Hudson, T. C. Richards, W. McN. Spiers, R. E. Tidswell, C. F. C. Ward, W. A. R. Keddie; (Nov. 17, Sen. Nov. 7) T. M. Gay, J. Ll. Griffiths, P. P. Villa. As Acting Pilot Officers on probation:—(Mar. 4) J. H. Hoare-Scott, D. M. Ryan; (July 17) J. Roberts (substituted for notification of Sept. 13, p. 5494, col. 1, under the heading "Administrative and Special Duties Branch); (July 26) A. E. Mills; (Nov. 2) W. H. Thomas.

The undermentioned Pilot Officers on probation are confirmed in their appointments and promoted to the rank of Flying Officer:—(Sept. 27) J. P. B. Almack; (Oct. 1) S. F. Preston; (Oct. 2) C. L. Elliott; (Nov. 23) W. C. Potter.

The undermentioned Acting Pilot Officers on probation are graded as Pilot Officers on probation:—(Aug. 31) S. Body; (Nov. 3) H. A. De Freitas.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant:—(Sept. 3) J. H. C. Beard, K. W. Hole, R. Bennett, D. M. Walbourn, E. M. Webb; (Sept. 4) C. G. B. McClure; (Sept. 9) A. J. Sayer; (Sept. 18) R. Rendle.

The undermentioned Pilot Officers are promoted to the rank of Flying Officer:—(Sept. 4) J. E. Jackson; (Sept. 18) R. C. Hockey; (Sept. 25) J. G. Forbes, W. J. Searle, A. G. Evill, R. C. Pargeterr, E. G. Hughes, A. G. A. Fisher; (Sept. 26) H. Arnott, C. H. Bacon, J. R. A. Bailey, J. J. F. H. Bandinel, I. N. Bayles, P. R.-F. Burton, A. E. Cook, H. H. Eccles, J. L. Halstead, W. R. A. Knocker, T. H. A. Llewellyn, M. J. P. Martin, P. F. Mayhew, J. R. H. Merifield, G. H. Nelson Edwards, R. P. C. Thompson, D. Warburton; (Oct. 3) C. A. Alldis, T. P. E. Barlow, J. Brotherton-Ratcliffe, A. Bulmer, J. A. G. Coates, E. D. Crew, R. E. Dent, D. J. Dunn, W. L. Ellingham, R. G. Furness, R. A. V. Gascoyne-Cecil, R. H. Gordon, R. V. L. Griffiths, I. S. Haggie, A. W. Hirons, F. D. Hughes, E. W. Lindsay, J. Lockhart, P. F. Mallender, J. C. Melvill, H. T. Morgan, J. L. Nunn, A. G. Page, R. C. Parker, H. H. Percy, D. Petley, J. C. E. Robinson, J. W. Seddon, J. G. R. Sturrock, R. L. Tanner, A. B. Tisdall, R. P. Turner, N. R. Wheatcroft, R. S. Woodward; (Nov. 26) T. G. F. Ritchie.

P/O. on probation M. Luczkow resigns his commission (Nov. 10).

The notification of Sept. 27 (p. 5718, col. 2) concerning P/O. G. H. Goodman is cancelled.

Erratum.

In notification of Oct. 4 (p. 5837, col. 1), *for* B. Grimston *read* The Hon. B. Grimston.

Technical Branch.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—Sergeant: (Sept. 6, Sen. May 30) S. L. Hill. Corporal: (Nov. 2, Sen. Oct. 9) D. G. Sainsbury.

P/O. on probation E. M. Hook is confirmed in his appointment (Oct. 19).

P/O. on probation R. D. Poore is confirmed in his appointment and promoted to the rank of Flying Officer (Nov. 22).

Balloon Branch.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—Flight Sergeant: (Nov. 8, Sen. Oct. 22) L. S. Prosser. Corporals: (July 3, Sen. June 25) A. G. Goode; (Aug. 24, Sen. Aug. 6) R. J. Rhodes; (Oct. 22 (Sen. Oct. 7) W. W. Green; (Oct. 30, Sen. Oct. 11) E. H. N. Breeze; (Nov. 8, Sen. Oct. 21) A. Stevens; (Nov. 8, Sen. Oct. 22) D. S. Boyle, J. I. Williamson; (Nov. 11, Sen. Oct. 22) V. G. Biller. Leading Aircraftmen: (Sept. 20, Sen. Sept. 5) L. J. Gooch; (Nov. 8, Sen. Oct. 22) A. L. Ll. Evans; (Nov. 9, Sen. June 24) G. E.

SERVICE AVIATION (CONTINUED)

Thomas. Aircraftmen 1st Class: (Oct. 22, Sen. Oct. 7) S. de P. Gauvain; (Oct. 31, Sen. Oct. 11) J. P. H. Jacobs; (Nov. 7, Sen. Oct. 21) P. H. Kerslake; (Nov. 11, Sen. Oct. 22) E. J. Fitz-Gerald, D. M. Mackusick. Aircraftmen 2nd Class: (July 3, Sen. June 25) R. S Ridgway; (Nov 9, Sen. Oct. 22) A. L. Thompson.

Act. P/O. on probation K. M. Buckley is graded as Pilot Officer on probation (Aug. 31).

Administrative and Special Duties Branch.

The undermentioned are granted commissions as Flight Lieutenants:—(Sept. 1, 1939, Sen. Dec. 16, 1935) Sqn. Ldr. R. S. Barbour (R.A.F.O.); (June 18) Lt. H. V. Smith, D.C.M. (R.A.R.O.); (Nov. 22) Major K. M. Ball, D.S.O., R.A. (Ret.).

The undermentioned are granted commissions for the duration of hostilities as Flying Officer:—(Sept. 24, Sen. Sept. 1, 1939) J. E. M. Atherley (substituted for notification of Nov. 5). As Pilot Officers on probation:—(June 28) T. H. Brown, H. E. Morris; (June 29) P. A. Calton, T. A. Lyon, E. V. Todd; (July 17) R. Gilroy; (July 27) J. Cassells (substituted for notification of Aug. 20), A. F. Tabraham; (Aug. 26) D. A. Pope; (Sept. 16) R. R. Barber (substituted for notification of Oct. 22); (Sept. 21) C. B. Boughton (substituted for notification of Oct. 15); (Sept. 23) B. Ward; (Sept. 30) N. C. Mackenzie; (Oct. 3) C. T. Robinson; (Oct. 5) F. G. Bird; (Oct. 7) C. A. Mackay; (Oct. 15) N. J. Tuck; (Oct. 16) J. J. Curnow; (Oct. 18) R. E. Salvesen; (Oct. 19) G. Hathorn; (Oct. 21) P. Higson, B. Webb; (Oct. 22) O. P. Ladyman, W. E. McVicar, C. D. Stephenson; (Oct. 25) W. D. Annan, H. E. Arnholz, F. W. Arnold, H. J. Boland, W. H. Bontoft, I. T. Bowen, F. Bowles, D. V. Briggs, N. W. Broughton, R. C. Chalk, G. Collinson, A. H. L. Cooper, A. L. Franks, A. Garden, A. E. R. Gilligan, G. P. Grieve, J. W. Gunstone, P. T. Hammond, H. A. Hardman, R. A. Harrison, L. I. Hewitt, C. G. Hutchings, J. C. N. Kilner, H. C. Lawrence, R. H. M. Macdonald, J. A. Mason, J. McGibbon, G. E. Meredith, J. N. Owen, J. A. Pitcher, A. S. G. Robertson, J. B. Robinson, T. McD. B. Russell, G. P. Scott, R. Scourfield Evans, J. C. W. Seex, A. C. Sherborne, J. Shillinglaw, F. W. C. Smith, J. H. Smith, E. St. John, S. Thomas, A. W. Trotter, H. J. Truett, E. Westlake-Guy, P. H. F. White, G. H. Wilkinson, A. S. Williams, J. P. Young; (Oct. 26) E. Davies, M. F. P. Lubbock; (Oct. 29) E. J. Matthews, Viscount I. B. Ratendone; (Nov. 1) A. d'Agapeyeff, G. W. Bain, R. Beeching, H. A. Bohane, G. L. Bond, H. Brown, H. Coleman-Smith, A. E. S. Cooper, L. Cox, E. V. Cunliffe, H. C. Debenham, J. T. De Fraine, J. R. De La Mare, R. H. Dobbie, G. M. Donner, A. H. Duggan, W. T. Elverston, V. D. O. Ezekiel, F. L. Fox, J. H. Griffith-Williams, B. W. Gunn, J. A. L. Henderson, A. Henry, E. M. F. Hudson, W. L. Ives, H. G. Kennard, S. A. Khan, J. T. S. Mallard, J. C. Mulholland, T. Sandilands, K. M. Seamell, G. D. Shand, C. Shaw, B. B. Smith, W. J. Voisey-Youldon, J. K. R. Walker, G. A. Welfear, P. D. Whitting, P. Whyte, R. W. Willmer; (Nov. 5) A. D. Bovill, G. A. Capes, F. J. Levens, A. J. Perry, P. E. C. Romney; (Nov. 6) G. Stott; (Nov. 7) J. G. Browning, W. B. Home-Gall, A. N. MacGill, D.C.M.; (Nov. 8) J. T. Agelasto, N. A. Argenti, A. Armitage, E. J. Bannister, W. B. Davies, F. R. Derry, A. Donaldson, E. F. Drew, A. W. Eves, J. D. Farmiloe, G. D. Gardner, M.C., W. C. Green, O. Hailstone, B. Hale, A. F. Hamilton-Smythe, L. Hartley, D. J. T. Henderson, L. N. Higgins, K. P. H. Hunt, W. Jamieson, F. D. Jones, J. B. C. Lamburn, J. S. Leslie, J. MacDonald, H. McClunan, D. H. Mills, R. C. Milne, T. J. Moffatt, P. O'Dwyer, K. A. L. Offord, F. W. Quiggin, E. A. B. Radford, G. Rees, P. M. Rogers, W. J. B. Saunders, E. S. Shapley, N. S. Smith, P. L. Stephens, E. Swan, I. V. Thomas, W. S. Thomas, J. A. Trevenen, C. M. G. Wallwork, F. C. White, R. C. White, W. Wilkinson, G. C. Willis, R. J. Woodroffe; (Nov. 9) C. T. Anderton, T. H. Bent, A. J. Booth, L. R. Brass, C. W. A. Brown, W. M. Christie-Miller, A. Duncan, J. M. Farquhar, W. L. Fleming, A. Fraser, B. H. F. Godley, F. E. Greenwood, L. M. Hanbury-Bateman, A. A. Harley, R. B. Hirsch, E. W. Hitchings, J. V. M. Howe, F. C. Jackson, A. L. Jones, J. C. B.-W. Leonard, J. E. L. Lewington, D. J. Lown, E. H. Maddick, A. E. Matthew, W. W. Mitchell, J. W. Morgan, P. L. Murphy, T. G. Noble, A. G. Oliver, R. B. Oliver, A.-S. Ostens, R. S. Rowlands, A. F. L. Smith, C. T. Smith, R. F. Sutherland, W. Thomas, J. W. Troughton, N. J. L. Weir, E. C. Wheatley, N. Wild, P. E. Wilder, A. B. N. Wilkinson, E. L. Worthington; (Nov. 13) V. A. Loftus-Paton; (Nov. 18) E. C. Allen, R. E. Cole, R. S. Courtney, A. E. Davenport, E. Eden, J. S. Kay, P. S. T. Kingdon, W. E. Plummer, H. P. Pollard, A. C. Smith, D. N. Thomas. Sergeants: (Oct. 17, Sen. Sept. 26) B. B. Braunston; (Nov. 11, Sen. Aug. 30) R. Foulkes Corporals: (Nov. 5, Sen. Oct. 15) C. Mepham; (Nov. 11, Sen. Oct. 17) J. L. Burness. Leading Aircraftmen: (Oct. 24, Sen. Sept. 19) D. M. Dent; (Nov. 4, Sen. Sept. 20) R. V. Quye. Aircraftmen 2nd Class: (Nov. 5, Sen. Oct. 24) R. S. Scrivener; (Nov. 8, Sen. Oct. 14) F. W. Gellatly; (Nov. 11, Sen. Oct. 28) E. H. Lush.

The undermentioned Pilot Officers on probation are confirmed in their appointments:—(Sept. 9) J. D. Bowman, F. Brewer, C. G. Wood; (Sept. 19) H. G. Hudson, A. G. Mower, H. A. B. Robb, M.C., A.F.C., W. H. Thomas, C. Volk, H. Williamson, S. J. Wines; (Sept. 26) C. L. Blake, F. Carr, A. H. Day, D.F.C., H. Entwisle, W. H. Gibson, A. G. Harrison, J. Jameson, A. W. Robinson, J. J. B. Rutter, F. C. Staines, S. L. Symondson, R. F. E. Wickham; (Oct. 7) J. S. Hodges; (Oct. 8) F. L. Wills; (Oct. 10) W. F. Willis; (Oct. 12) M. P. Dalrymple; (Oct. 18) S. G. Frogley, D.S.O., D.F.C.; (Oct. 23) C. O. Powis; (Oct. 24) T. G. Whitlock, C. M. Horsfall; (Oct. 25) H. V. Stammers, D.F.C., V. E. R. Blunt, G. H. L. Easterbrook; (Oct. 28) C. H. A. A. A. Hankey; (Oct. 30) B. W. Dalyrymple, W. P. Stewart, D.S.O.; (Nov. 3) H. F. Payne; (Nov. 4) S. D. Harrower; (Nov. 5) J. D. Irving, O.B.E., M.C.; (Nov. 6) L. C. Mein; (Nov. 7) M. J. C. Allom; (Nov. 8) R. D. A. Clowes; (Nov. 17) C. C. Cholmondeley; (Nov. 20) Rt. Hon. W. G. H. W. Lord Waleran.

The undermentioned Pilot Officers on probation are confirmed in their appointments and promoted to the rank of Flying Officer:—(Sept. 9) L. H. R. Lewis; (Sept. 12) C. S. Emden, D.F.C.; (Sept. 19) S. Buckenham, C. A. Mackenzie, H. J. Pritchett, H. Sacre, E. B. Thomson; (Sept. 26) M. E. Bradley, L. E. Crawley, W. G. Foulds, S. E. Rowley; (Oct. 3) R. H. Esencourt; (Oct. 10) F. J. F. Smythe; (Oct. 11) J. A. Livingston; (Oct. 16) L. C. Saxby, M. B. Smith; (Oct. 18) L. F. Hutcheon, A.F.C., W. H. F. Brunskill; (Oct. 23) T. H. Newsome; (Oct. 24) A. V. Collins; (Oct. 25) G. J. Mapplebeck, E. C. Ormonde, E. C. Owens; (Oct. 30) L. Bertrand; (Nov. 13) A. Amato Gauci, J. E. S. Long; (Nov 21) G. H. Wass.

Act. P/O. on probation J. P. Turtle is graded as Pilot Officer on probation (July 22). (Substituted for notification of Oct. 8.)

The undermentioned Pilot Officers on probation are transferred to the Technical Branch:—(Apr. 24) P. P. Love; (July 25) L. J. Fowler.

The undermentioned officers are transferred to the Balloon Branch (Mar. 27):—Flying Officers: Lord Ventry. Pilot Officers: J. Molesworth-St. Aubyn, J. B. Watson, D. Ross, H. S. Hargreaves, L. N. Henderson, L. S. Duffill, E. Lyon, R. W. Beresford, E. G. Pole, F. J. Ainge.

The undermentioned resign their commissions:—Flying Officers: (Nov. 20) H. E. Twaits; (Nov. 28) F. H. Murray. Pilot Officer: (Nov. 9) S. A. Dismore. Pilot Officer on probation: (Nov. 20) S. E. Schofield.

The commissions of the undermentioned Pilot Officers on probation are terminated on cessation of duty:—(Nov. 19) H. Parker, J. S. Stacey; (Nov. 22) C. T. Maclaren, G. N. Thompson, G. R. Turner; (Nov. 26) W. F. R. Boardman.

Errata.

The notification of Nov. 5 concerning D. C. A. McPherson is cancelled.

In notification of Aug. 13 concerning P/O. on probation W. A. Lane, *for* July 31 *read* Aug. 1.

The notification of Oct. 29 concerning the undermentioned should have appeared under the heading of "Royal Air Force" and not "Royal Air Force Volunteer Reserve": Warrant Officer R. S. Sweetlove, Flt. Sgt. R. Mallett, Flt. Sgt. H. C. F. Fletcher, Flt. Sgt. A. S. Flatters, Cpl. G. A. P. Duhy.

Equipment Branch.

C. J. V. Gray is granted a commission for the duration of hostilities as Acting Pilot Officer on probation (Sept. 16).

P/O. on probation W. E. Hole is confirmed in his appointment (Nov. 13).

The undermentioned Pilot Officers on probation are confirmed in their appointments (Sept. 18) and promoted to the rank of Flying Officer: (Nov. 19) E. A. Bradly, T. W. James, J. B. Jeyes, F. J. W. Knowles, A. L. Mitchell, P. E. Willson.

P/O. on probation A. L. Scull is confirmed in his appointment (Sept. 9) and promoted to the rank of Flying Officer (Nov. 24).

The undermentioned Acting Pilot Officers on probation are graded as Pilot Officers on probation:—(July 24) D. R. Paine; (July 30) H. F. G. Tristam.

Accountant Branch.

L.A/C. E. R. H. Scott is granted a commission for the duration of hostilities as Acting Pilot Officer on probation (Nov. 1, Sen. Oct. 10).

The undermentioned Acting Pilot Officers on probation are graded as Pilot Officers on probation:—(Sept. 21) C. Manson; (Oct. 11) H. A. Barnes, G. S. Batten, H. McG. Berry, H. Booth, J. C. C. Braint, W. E. Brooke, C. A. Butt, D. H. P. Cannon, A. C. E. Caplen, B. J. Clough, H. S. Coley, C. B. Cross, A. W. Deacon, S. L. Drew, J. B. Fleming, F. Green, H. A. Haire, S. T. Hawes, M. F. Hickman, E. H. Kemp, D. G. Kershaw, H. Lucas, C. D. Mactaggart, F. E. Main, C. H. Mears, N. Roberts, K. C. Robins, S. F. Rogers, G. J. Sellers, H. J. Smethurst, G. T. Smith, H. G. Swindells, E. Thompson, T. H. Trump, N. A. Tye, W. R. Ward, A. Whiteley, J. H. Worrall, C. S. Elphinstone, A. S. Clarke, J. E. Jenkins.

Medical Branch.

The undermentioned are granted commissions for the duration of hostilities:—As Squadron Leader: (Nov. 8) A. G. Palin, B.M., B.Ch., M.R.C.S., L.R.C.P., F.R.C.S. (E). As Flight Lieutenants: (Nov. 5) R. G. E. Richmond, M.R.C.S., L.R.C.P.; J. B. Shield, M.B., Ch.B., F.R.C.S. (E). As Flying Officers: E. Anthony, M.R.C.S., L.R.C.P.; O. H. E. Bayles, M.R.C.S., L.R.C.P.; F. W. Belford, M.B., Ch.B.; P. J. Connolly, M.B., Ch.B.; D. A. Craib, M.B., Ch.B.; G. M. Evans, M.R.C.S., L.R.C.P.; D. A. Ferguson, M.B., B.S., M.R.C.S., L.R.C.P.; W. H. Galloway, M.B., Ch.B.; W. Gordon, M.B., Ch.B.; B. S. Grant, M.B., B.S., M.R.C.S., L.R.C.P.; C. O. Greer, M.B., B.Ch.; R. S. Holgate, M.B., Ch.B.; D. M. Kelleher, M.B., B.Ch.; H. Kenyon, M.B., Ch.B.; F. D. MacCarthy, M.R.C.S., L.R.C.P.; R. R. McSwiney, M.B. B.S., M.R.C.S., L.R.C.P.; H. Silverman, M.B., Ch.B.; D. McG. Simpson, L.R.C.P. & S., L.R.F.P.S.; N. Stephen, M.R.C.S., L.R.C.P.; R. G. MacL. Wedderburn, M.B., Ch.B.; W. P. Weir, M.B., Ch.B.

Dental Branch.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers:—(Nov. 5) H. G. J. Griffiths, L.D.S.; N. A. Hawkins, L.D.S.; F. S. Krusin, B.D.S., M.R.C.S., L.R.C.P.; I. H. J. Morgan, L.D.S.; H. J. Phillips, D.D.S., L.D.S.; R. G Siggers, L.D.S.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant:—(July 18) H. C. Davis, L.D.S., R.C.S. (Eng.); (Oct. 16) W. R. Williams, L.D.S.; (Oct. 23) T. D. H. Millar, L.D.S.; M. Malleson, L.D.S.

Chaplain's Branch.

The undermentioned are granted commissions for the duration of hostilities with the relative rank of Squadron Leader:—(Nov. 12) The Rev. E. A. Buchan, B.A.; (Nov. 19) the Rev. S. W. A. Collins, the Rev. R. F. Diggle, the Rev. C. E. G. Jones, the Rev. H. J. J. Harries, M.A., the Rev. F. L. Trewela, B.A.

Auxiliary Air Force

General Duties Branch.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant:—(Nov. 13) J. C. Barclay; (Nov. 24) G. N. S. Cleaver, D.F.C.

F/O. P. G. M. Hancock is transferred to the Administrative and Special Duties branch (Nov. 25).

The undermentioned are transferred to the Administrative and Special Duties Branch:—(March 27) Squadron Leader: J. E. D. Benham. Flight Lieutenant: T. R. Bird. Flying Officers: The Earl of Eldon, A. M. Makepeace. Pilot Officer: E. S. Riley.

Balloon Branch.

F/O. G. A. Mitchell is transferred to the Administrative and Special Duties Branch (Nov. 26).

Administrative and Special Duties Branch.

P/O. P. Reeves is promoted to the rank of Flying Officer (Sept. 3).

Auxiliary Air Force Reserve of Officers

General Duties Branch.

F/O. P. B. Robinson relinquishes his commission on account of ill-health (Dec. 3).

Balloon Branch.

The transfer of the undermentioned to the Balloon Branch effected by the omnibus *Gazette* notification of Aug. 20 is cancelled:—Squadron Leaders: J. E. D. Benham (A.A.F.), E. S. C. Grune (R.A.F.V.R.) Flight Lieutenants: T. R. Bird (A.A.F.), E. W. Carmichael (R.A.F.V.R.), G. M. Johnstone (R.A.F.V.R.), W. P. Lewis (R.A.F.V.R.), F. W. Carryer (R.A.F.V.R.), G. T. Stoneham (R.A.F.V.R.), J. D. McEwen (R.A.F.V.R.). Flying Officers: The Earl of Eldon (A.A.F.), A. M. Makepeace (A.A.F.), A. R. Hind (A.A.F.), E. J. D. Ettwell (A.A.F.), R. E. Stephens (R.A.F.V.R.). Pilot Officers: R. C. Hawkins (A.A.F.), E. F. Tanner (A.A.F.), T. Rowley (A.A.F.), H. J. Cuff (A.A.F.), W. J. Amlot (A.A.F.), C. B. Hardy (A.A.F.), L. G. Mobsby (A.A.F.), C. P. Bennett (A.A.F.), H. Clayton (A.A.F.), R. H. Burdon-Cooper (A.A.F.), E. H. Lee (A.A.F.), J. F. Venner (A.A.F.), P. B. Doorly (A.A.F.), H. S. Thomas (A.A.F.), G. Grayriggs (A.A.F.), A. R Gillespie (A.A.F.), L. Mackintosh (A.A.F.), F. Haworth (R.A.F.V.R.), E. S. Riley (A.A.F.), A. R. Cousins (A.A.F.).

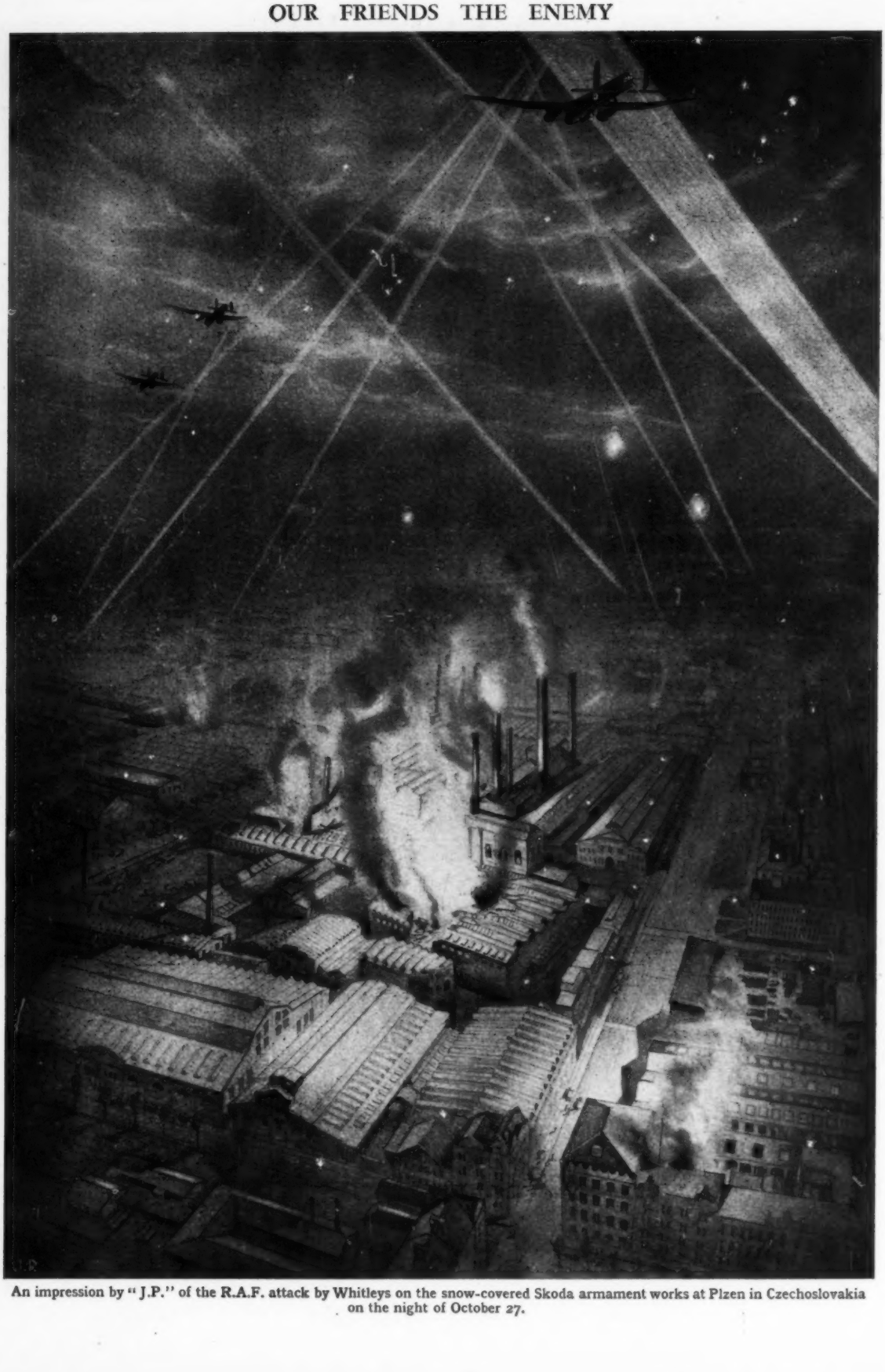
The undermentioned, who were not included in the June Air Force List, are to be considered as transferred to the Balloon Branch (March 27). (See notification of Aug. 20):—Flying Officers (since promoted: (March 27) H. Macfarlane, E. N. Adlington. Pilot Officer: (May 15) F. J. Kershaw.

Women's Auxiliary Air Force

The undermentioned are appointed Assistant Section Officers:—(Nov. 20) Cpl. Miss A. D. Anderson, Cpl. Miss M. E. Baker, Cpl. Miss D. M. Barton, Sgt. Miss E. O. Clark, A/CW.1 Miss R. F. E. Davies; A/CW.2 Miss K. L. Downs, Cpl. Mrs. B. B. Emerson, A/CW.2 Miss P. G. Hollick, A/CW.1 Miss M. M. Hunter; A/CW.2 Miss M. A. Keith, Cpl. Miss E. E. Marks, Cpl. Miss E. E. Marlow, A/CW.2 Miss D. Norwood, A/CW.2 Mrs. M. A. Pateman, Sgt. Miss J. M. Roffey, A/CW.2 Mrs. J. Selby, Sgt. Miss I. F. Stone, Sgt. Miss K. Veitch, A/CW.2 Miss M. Wilson, Sen. Sgt. Miss K. M. Wynard; (Nov. 27) A/CW.2 Miss D. A. Bliss, A/CW.1 Miss P. J. S. B. Dance, A/CW.1 Miss D. M. De Sausmarez, A/CW.1 Miss P. Grey, A/CW.1 Miss T. J. Horley, Cpl. Miss P. J. Martin, A/CW.1 Mrs. M. E. Pawsey, A/CW.2 Miss R. V. Robinson, A/CW.2 Mrs. V. G. Sherring, Cpl. Miss J. Tomkin, A/CW.1 Miss S. Wiles, A/CW.1 Miss R. Young.

The undermentioned relinquish their appointments:—(Oct. 23) F/O. Miss D. Moon; (Nov. 15) Sect. Officer Mrs. V. Crosland; (Oct. 6) Assist. Sect. Officer Miss B. A. Ralphs; (Nov. 8) Assist. Sect. Officer Mrs. E. H. Johnson; (Nov. 16) Assist. Sect. Officer Miss D. M. M. Whiddett; (Nov. 19) Assist. Sect. Officer Mrs. D. E. Yates.

OUR FRIENDS THE ENEMY



An impression by "J.P." of the R.A.F. attack by Whitleys on the snow-covered Skoda armament works at Plzen in Czechoslovakia on the night of October 27.

THE INDUSTRY

Titanine, Limited

AT a meeting of the directors of the above company, an interim dividend of 10 per cent. in respect of the financial year to March 31, 1941, was declared, and the same will be payable to shareholders on the register of members on December 18, 1940. This dividend is the same as the interim dividend declared last year.

Protecting Protection

IMPERIAL CHEMICAL INDUSTRIES have developed a cheap and easy method of rot-proofing sandbags. It consists of dipping the bags in two common chemicals, sodium carbonate and copper sulphate. Treatment with this mixture at the present price works out at no more than one-tenth of a penny per bag of normal size. It will, it is estimated, increase the life of sandbags in service at least eight times. The bags must be treated before they are filled. No rot-proofing process is satisfactory when applied to bags already in place. Whether they are treated before or after being sewn up, particular care must be taken to treat the thread used for the seams as it is often here that the rotting begins.

The mixture used for the rot-proofing of sandbags is technically known as a basic copper carbonate suspension. Use 4½ lb. of soda ash or 11½ lb. of soda crystals in 5 gallons of water and stir this slowly into a solution of 10 lb. of copper sulphate crystals in 30 gallons of water. Use a 50-gallon wooden vessel—not one of iron or galvanised iron. Make up the quantity to 40 gallons and add 2 oz. of Calsolene oil HS. (Calsolene oil HS is a "wetting agent." It assists the penetration of the fabric and adds very little to the cost.) Stir well. Immerse the sandbags until they are thoroughly saturated. Remove the excess liquor by wringing or in a hydro-extractor. After wringing, the bags should weigh twice their original weight. The bags should then be dried at a low temperature. Bags should be immersed for at least five minutes if cold water is used, but the process can be speeded up by warming the water to 30-40 deg. C. (85-100 deg. F.).

Further particulars, including directions for a two-bath process, can be obtained from Imperial Chemical Industries, Ltd.

Gas Producer Plants

WIDELY used throughout the aircraft industry are various types of gas producer plants. The adaptability of these producer gas plants will be appreciated when it is realised that they are used for smelting ore and also for heat treatment and stove enamelling of the finished parts. A subsidiary, but none the less important, use is factory heating and canteen cooking. Of even greater importance these days is their use as a stand-by to the ordinary supply. Plants can be safely installed in the open with a reserve of coke or anthracite fuel, and should the main supply fail, or cannot be immediately increased for works' extensions, the plant is started up without delay and uninterrupted production maintained during an otherwise dead period.

The Power-Gas Corporation Ltd. have specialised equipment suitable for any purpose ranging from small self-contained units gasifying hourly a few hundredweights of fuel, to large automatic installations of many tons capacity. The smaller plants have a self-vaporising generator, fed by hand once or twice each hour, the residual ash being removed daily from the water lute below. The hot gas, passing through a coke-filled and water-sprayed washer, is cooled and cleaned, and after continuing through a dry scrubber box incorporating, where required, sulphur purification, the cool, clean gas is passed forward for distribution at the requisite pressure by a centrifugal exhauster-fan.

For larger outputs the fuel is fed mechanically from overhead bunkers, with special provision ensuring good distribution even where the fuel is not well graded. This feed automatically responds to the demand made upon the plant for gas. These large generators are completely water-jacketed, with no refractory lining, and provide steam for blast saturation. An even fire zone and continuous removal of ash is ensured by means of a mechanical revolving grate, which also breaks up and extracts any clinker which may be formed.

For non-bituminous fuels the cleaning plant is similar in principle to that described for the smaller plants, but where volatiles are present special provision is made to remove tarry matter from the gas, which finally goes forward for distribution, conforming to a high standard of cleanliness, purity and pressure.

Further particulars of all the types available may be had from The Power-Gas Corporation Ltd., Birch Garth, Duke's Wood Avenue, Gerrards Cross, Bucks.

INCREASES OF CAPITAL

PETTERS, LTD.—Manufacturers of compression-ignition and internal combustion engines, etc., Falcon Works, Loughborough, Leics. The nominal capital has been increased by the addition of £75,000, in £1 shares, beyond the registered capital of £25,000. 35,000 ordinary shares were allotted to the Brush Electrical Engineering Company, Ltd., on October 22, 1940.

BLOCTUBE CONTROLS, LTD.—Aeronautical experts and consultants, manufacturers of aeroplanes, balloons, parachutes, motor cars, cycles, etc. The nominal capital has been increased by the addition of £100,000 beyond the registered capital of £1,000. The additional capital is divided into 50,000 5 per cent. redeemable non-cumulative preference and 50,000 ordinary shares of £1 each.

EXACTOR CONTROL CO., LTD.—Aeroplane, automobile and mechanical engineers, electricians, etc. The nominal capital has been increased by the addition of £1,600 in £1 ordinary shares beyond the registered capital of £4,250.

PUBLICATIONS RECEIVED

Dynamic Defence, by Liddell Hart; 2s. 6d., Faber and Faber, Ltd., 24, Russell Square, London, W.C.1.

Deeds that Held the Empire by Air, by L. E. O. Charlton; 7s. 6d., John Murray, Albemarle Street, London, W.1.

Flight Without Power, by L. B. Barringer; 17s. 6d., Sir Isaac Pitman and Sons, Ltd., Parker Street, London, W.C.2.

Practical Solution of Torsional Vibration Problems, Vol. I, by W. K. Wilson; second edition, 42s., Chapman and Hall, 11, Henrietta Street, London, W.C.2.

AERONAUTICAL PATENT SPECIFICATIONS

Published October 10, 1940.

1938

35311. PROSDOCIMI, A. Aircraft (526,162).

1939

40. UNITED AIRCRAFT CORPORATION. Screw propellers and control mechanism therefor (526,100).

1403. KOLLSMAN, P. Direction-indicators (526,164).

3444. PHILLIPS & POWIS AIRCRAFT, LTD., and FENNER, R. J. Adjustment of aircraft rudder-bars (526,026).

4035. BAYNES, L. E., and MUNTZ & CO., LTD., A. Motive power means for aircraft (526,104).

4056. BAYNES, L. E., and MUNTZ & CO., LTD., A. Aircraft (526,105).

6321. RUBBRA, A. A., and WEST, H. E. W. Driving of accessories on aircraft (526,028).

7153. HIVES, E. W., BARRINGTON, T. B., and RUBBRA, A. A. Variable-pitch airscrews (526,167).

7409. STANDARD TELEPHONES & CABLES, LTD., and EARP, C. W. Indicators for blind-landing approach systems.

7413. AIRCRAFT COMPONENTS, LTD., NICHOLL, E. J., and ARMSTRONG, W. Aircraft undercarriages with resilient wheel mountings (526,116).

7561. AMIOT, F. Streamlined cowlings for aircraft engines (526,127).

7654. SPERRY GYROSCOPE CO., INC. Trim indicator for aircraft (526,150).

7891. HELMORE, W. Airspeed indicators (526,269).

7916. REID, G. H. Device for testing instruments and particularly gyroscopic aircraft instruments (526,279).

7970. GERMAN, H. V. Sockets and the method of their attachment to the root ends of airscrew blades, spars, struts, or the like (526,290).

31429. DOWTY, G. H. Aircraft landing-gear (526,228).

Published October 17, 1940.

1939

8148. SOC. DE MECANIQUE GENERALE. Shock-absorbing means for aircraft landing-gear (526,352).

8170. SPERRY GYROSCOPE CO., INC. Automatic pilots for aircraft (526,360).

8235. RIETTI, E. Control gear, particularly for aircraft (526,388).

8274. LAVAUD, R. S. DE. Screw propellers (526,396).

8339. TECHNICAL IMPROVEMENTS, LTD. Method and means for fixing and timing magnetos, especially of aircraft engines (526,435).

8494. BUGATTI, E. Power plants of aircraft (526,460).

8495. BUGATTI, E. Means for cooling aircraft engines or engine radiators (526,461).

8573. HILLS & SONS, LTD., F., and SYKES, N. Method of and means for attaching sockets to airscrew blades (526,543).

8793. CASLAKE, C. R. Device for manœuvring and parking grounded aeroplanes, automobiles, and such like heavy mobile machines in relatively confined spaces (526,548).

8801. BLACKBURN AIRCRAFT, LTD., and EMSLEY, F. Aircraft (526,549).

Published October 24, 1940.

1939

6719. WESTLAND AIRCRAFT, LTD., and PETTER, W. E. W. Retractile undercarriages for aircraft (526,946).

6720 WESTLAND AIRCRAFT, LTD., and COX, R. P. Latching and locking mechanism, e.g., for the landing-gear of aircraft (526,947).

8704. DANVERS, E. Throttle-control mechanism for aircraft engines (526,764).

9418. MARCONI'S WIRELESS TELEGRAPH CO., LTD., and STEWART, J. Radio-operated automatic pilot systems (526,722).

9553. MARCONI'S WIRELESS TELEGRAPH CO., LTD. Navigation: aiding radio-receiving systems (526,859).

9554. SOC. FRANCAISE RADIOELECTRIQUE. Direct-reading radio direction-finders (526,860).

9629 ARADO FLUGZEUGWERKE, GES. Retractable undercarriage for aircraft (526,872).

9655. TAMPIER, R. Aircraft (526,899).

9678. TAMPIER, R. Aircraft (526,904).

9695. ENGLESSON, J. E. Internal-combustion engines having injection pumps and driving screw propellers (526,909).

9796. HEINKEL, E. Supporting-float for aircraft (526,922)

9995. SPERRY GYROSCOPE CO., LTD., NISBETT, R. H., and HARDING, W. G. Automatic steering systems for craft (526,980).

14901. BUGATTI, E. Vehicles provided with screw propellers (526,789).

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The charge for advertisements in these columns is 3d. per word, minimum 4/-. Each paragraph is charged separately. Special rates: Situations Wanted only, 2d. per word, minimum 2/-. Advertisements for Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders, 3/- per line. Each issue closes for press first post Friday. Insertion in a particular issue is not guaranteed, and advertisements too late for a particular issue or crowded out will appear in the following issue unless we are otherwise instructed. Series Discounts.—Particulars on application. The Proprietors are not responsible for clerical or printers' errors, although every care is taken to avoid mistakes. All advertisements must be prepaid. Cheques and Postal Orders made payable to "FLIGHT" Publishing Co., Ltd., and crossed. Notes cannot be traced if lost in transit. They must, therefore, be regarded as being despatched at sender's risk. Alternatively, they may be sent per registered post. Box Numbers.—For the convenience of private advertisers, letters may be addressed to numbers at the offices of "FLIGHT." When this is desired, the sum of 1/- must be added to the advertisement charge, which must include the words "Box 000, c/o 'Flight.'" Address for replies, "No. 000, c/o 'FLIGHT,' Dorset House, Stamford Street, London, S.E.1." The Proprietors retain the right to refuse or withdraw advertisements at their discretion.

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IMPORTANT NOTICE

Owing to the Christmas Holidays, next week's issue of "FLIGHT" (dated December 26th) has gone to press earlier than usual.

In accordance with the notice that appeared last week only those Classified Advertisements which have already been received can be inserted in next week's issue.

AIRCRAFT FOR SALE

W. S. SHACKLETON, Ltd., wish to remind their numerous clients and all others interested in the sale or purchase of aircraft that they are still actively operating as hitherto, and all enquiries will be given their usual prompt attention. We would specially draw your attention to the following aircraft, as these have been serviced and are owned by Air Service Training, on whose behalf we have the honour to be acting:

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W. S. SHACKLETON, Ltd.. Aeronautical Consulting Engineers and Merchants; aeroplanes and motors purchased, packed and delivered to all parts of the world.—175, Piccadilly, London, W.1. Tel.: Regent 2448-9. Alternative address: The Willows, Bisley, Surrey. Telephone: Brookwood Surrey 3142. [1759

MALCOLM & FARQUHARSON LTD., Aircraft Agents; associated with R. MALCOLM Ltd., Aircraft Metal Workers. Enquiries invited.—601, Bath Road, Slough, Bucks. Tel.: Slough 23231.

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